

FLIGHT

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AND AIRSHIPS

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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list :—

1932.

- Nov. 18-Dec. 4. Paris Aero Show.
Nov. 25. Norfolk and Norwich Ae.C. Annual Ball.
Nov. 26. Comrades of the R.A.F. Re-union Dinner, Harrods'.
Dec. 1. "The Behaviour of Fluids in Turbulent Motion." Lecture by Mr. A. Fage, A.R.C.Sc., F.R.Ae.S., before R.Ae.S.
Dec. 2. Hampshire Ae.C. Annual Dinner and Dance.
Dec. 4. Close of Paris Aero Show.
Dec. 5. Hull Flying Club Annual Ball.
Dec. 8. "Air Survey." Lecture by Lieut. J. S. A. Salt, R.E., before R.Ae.S.
Dec. 10. Maidstone Ae.C. Annual Dance.
Dec. 14. "Air Power and Disarmament." Lecture by Group Capt. J. T. Babington before R.U.S.I.
Dec. 14. London Ae.C. Annual Dinner and Dance at Park Lane Hotel.
Dec. 15. "Lessons of the D.O.X." Lecture by Dr. C. Dornier, before R.Ae.S.
Dec. 23. Liverpool and Dis. Ae.C. Annual Dance at Mostyn House School.

1933.

- Jan. 6. Bristol and Wessex Ae.C. Dance at Grand Spa Hotel.
Jan. 12. "Airship Development Abroad." Lecture by Sqdn.-Ldr. R. S. Booth, before R.Ae.S.
Feb. 1. "Recent Operation in Kurdistan." Lecture by Group Capt. A. G. R. Garrod before R.U.S.I.
Feb. 2. "Operation of Aircraft Over Tropical Routes." Lecture by A. Plesman, before R.Ae.S.

EDITORIAL COMMENT

DISARMAMENT, in my view, will not stop war ; it is a matter of the will to peace. . . . The bomber will always get through. . . . The amount of time that has been wasted at Geneva in discussing questions such as the reduction in the size of aeroplanes, the prohibition of bombardment of the civil population, the prohibition of bombing, has really reduced me to despair. . . . Will any form of prohibition, whether by convention, treaty, agreement, or anything you like, not to bomb, be effective in war? Quite frankly, I doubt it. . . . Experience has shown us that the stern test of war will break down all conventions. . . . All disarmament hangs on the air. . . . I happen to know myself of at least three inventions deliberately proposed for use in the last war that were never used—potent to a degree! I wondered at the conscience of the world."

The above are some of the most striking sentences from the speech of Mr. Baldwin (a report is published on another page) during the debate on disarmament in the House of Commons last week. Our readers will doubtless be struck with the number of points on which Mr. Baldwin agrees with the leading article published in *FLIGHT* last week. Like us, he holds that no conventions will stop the use of bomber aircraft in war. Like us, he recognises that some instruments are too horrible to be used in war, and that when the conscience of the world forbids their use they will not be used. These admissions from a Chairman of the Committee of Imperial Defence and the leader of the Tory party are of first-class importance, and should lead to much saving of time at Geneva. We also find ourselves in agreement with Mr. Baldwin's remark that disarmament will not stop war. We do not admit the truth of Mr. Baldwin's statement that "the bomber will always get through." It will sometimes, but in the last war the bombing of London was made so expensive that after the Whitsun raid of 1918 the Germans never attempted it again. We look to our defence to repeat that performance. Likewise, we do not

believe that prohibition of bombing civilians will be quite ineffective. There is all the difference in the world between deliberate mass attacks on civilian areas and accidentally killing some individuals with bombs which have missed military objectives.

Excellent as was Mr. Baldwin's speech in many respects, in others it was curiously illogical. In one place he said that it was futile to forbid bombing. In another, he said that as in civil machines potential bombers might be found, it was necessary for the nations to devote the whole of their mind to seeing if it were possible so to control civil flying that such disarmament might be feasible. This sounds very like trifling, and perhaps Mr. Baldwin was not feeling very serious at that moment, for just before he had said that he was firmly convinced that if it were possible the air forces of the world ought to be abolished (we quite agree—if it is possible), and in answering the points raised by Capt. Guest he said, almost flippantly it would seem, that it was all very well to use the phrase "international control" (i.e., of civil flying), but nobody knew quite what it meant, and it had never been investigated. But, if bombing is to take place in any case, why worry about controlling civil aircraft?

Mr. Baldwin was weakest and most illogical in his remarks about national agreements and national conscience. He quoted the instance of gas in the late war to show that what he called "local restraint" was useless, and then mentioned three potent inventions which the conscience of the world had barred from use. Obviously restraint is possible. He seemed to think that the Allies were as culpable for using gas in retaliation on the Western front as the Germans were for introducing its use. Could anything be more wrong-headed? Once a rule of war is broken by one side, it is broken for all. Retaliation is an absolute necessity. The most telling moral to be drawn from the case of gas, is that the Allies never used it on any front except the Western front. Their conscience, their sense of humanity and of national right and wrong, their respect for their pledged word, prevented them from using it against those who fought on the side of the Germans but had not used gas themselves. Obviously it is not true that (we quote Mr. Baldwin again) "Experience has shown us that the stern test of war will break down all conventions."

What, we ask, is the explanation of these contradictions? Why does Mr. Baldwin now find evidence that restraint is impossible, and then that restraint has been exercised? His mind seems to be in utter confusion on these questions. The fact is that he has overlooked the vital point which we emphasised in our leading article last week. Rules or conventions which attempt to deprive a belligerent of his natural rights will be condemned by the conscience of the world and will be universally disregarded. Reasonable prohibitions, which recognise the natural rights of a belligerent, will in the main be respected and obeyed. Bombing of military objectives is a natural right of a belligerent, for the bomb is only another form of shell, and a bomber aeroplane only a gun of extra long range. Chemical warfare is not a natural right of any belligerent. The use of gas by Germany, even though Germany had not signed the gas convention, was universally condemned by the conscience of the world, and since the war Germany has played her part in condemning the future use of gas. If our politicians, Mr. Baldwin and

others, will grasp that point about legitimate rights of belligerents, they will find the task of drawing up rules of war enormously simplified. We should recommend them all to read once again "Air Power and War Rights," by Mr. J. M. Spaight, and they will there find the matter lucidly set forth.

While on the subject of gas, we would draw attention to another passage in Mr. Baldwin's speech. He reminded the House that there was the Geneva Gas Protocol, signed by 28 countries in 1925, yet in experiments on the continent people were being taught the necessary precautions to take against gas dropped from the air. He went on to admit that we had made our own investigations and taken our own precautions, and he added the weighty words "any Government of this country in the present circumstances of the world would have been guilty of criminal negligence had they neglected to make their preparations." We quite agree; but that principle can be pushed a great deal further than Mr. Baldwin attempted to push it. So long as it is recognised, as Mr. Baldwin recognises the fact, that bombing will certainly be used in the next war, so long will it be criminal negligence for any Government of this country to neglect to make their preparations. We must, as we said last week, above all things maintain in the highest state of efficiency our Air Defence of Great Britain. Our fighter squadrons, our searchlights, our anti-aircraft guns, our Corps of Observers, must all be maintained at the highest pitch of training to which we can bring them. If we relax on that point we shall be like a man who removes the locks and bars from his door when he has been warned that burglars are about. The matter is one of life and death to us.

We are very glad to note that Mr. Baldwin gave an assurance, though it was not couched in his usual clear language, that if disarmament is to take place, we shall not disarm from our present stage of equipment. Our air defence programme, drawn up a good many years ago, provided for 52 squadrons in the command Air Defence of Great Britain. We are still 10 squadrons short of that minimum, and even so that programme was only regarded as a first instalment of our needs. We take it that Mr. Baldwin meant that if we agree to any disarmament, we shall do so on the supposition that our full programme had been completed, and also that any measure we undertake shall have reference to the air strength of other countries. So far as his words go, they are to the good; but if he believes, as he said, that disarmament will not stop war, why should he contemplate any reduction of our present very small forces? When we feel *absolutely assured* that the foreign lion is genuinely prepared to lie down with the British lamb, then we shall all be very glad to save a handsome sum on our fighting Estimates.

When we speak of the foreign lion, we should do well not to forget the Bear. We should like to know what evidence can be produced to show that the Soviet is ready to disarm. Unless that evidence is very convincing we should tremble at the thought of Europe lying unarmed at the mercy of the avowed foe of European and the world's civilisation.

Meantime we may hope that Mr. Baldwin's speech will put an end to the waste of time at Geneva in discussing the prohibition of bombing and the reduction of the size of aeroplanes; but something can be done, we feel sure, to protect civil populations, and anything of that nature is not waste of time.



(FLIGHT Photo.)

*" . . . charm'd magic casements, opening on the foam
of perilous 'skies,' in faery lands forlorn " Keats.*

British Aircraft at the Paris Aero Show



The British Aircraft Industry promises to be well represented at the Thirteenth International Aero Exhibition to be held in the Grand Palais, Champs Elysées, Paris, from November 18 to December 4. Not only are several aircraft firms represented on stands in the actual exhibition, but others will have demonstration machines at le Bourget during the exhibition. British aero engine and aero accessories firms will also be well represented at the show, and altogether Great Britain can be said to be showing considerable enterprise in these very difficult times.

This week we deal with the British aircraft to be exhibited in the Grand Palais. Next week we shall deal with the aero engine and aero accessories firms who are showing in Paris.

The Bristol Aeroplane Co., Ltd.

NO British aircraft firm has been a more frequent and consistent exhibitor at Paris Aero Shows than the Bristol Company. Scarcely an aero exhibition has been held in the Grand Palais but what Bristol aircraft have been there to uphold British prestige. It is therefore gratifying to find that again this year we shall see the familiar name "Bristol" on the banners flying above the stands. The exhibit on the aircraft stand (Bristols are also showing engines on a separate stand) will include a 1933 model "Bulldog" (Bristol Mercury IV S.2 engine) and specimens of Bristol types of metal construction.

The 1933 model "Bulldog" is essentially a development of the "Bulldog IIA," which is the standard single-seater fighter of the British Royal Air Force. All the improvements which long experience of the earlier machine has suggested have been incorporated in next year's model.

The most notable improvement is that associated with performance. By installing the more powerful Mercury IV S.2 instead of the Jupiter VII F advantage is taken of the smaller diameter of engine, while the extra power plays its

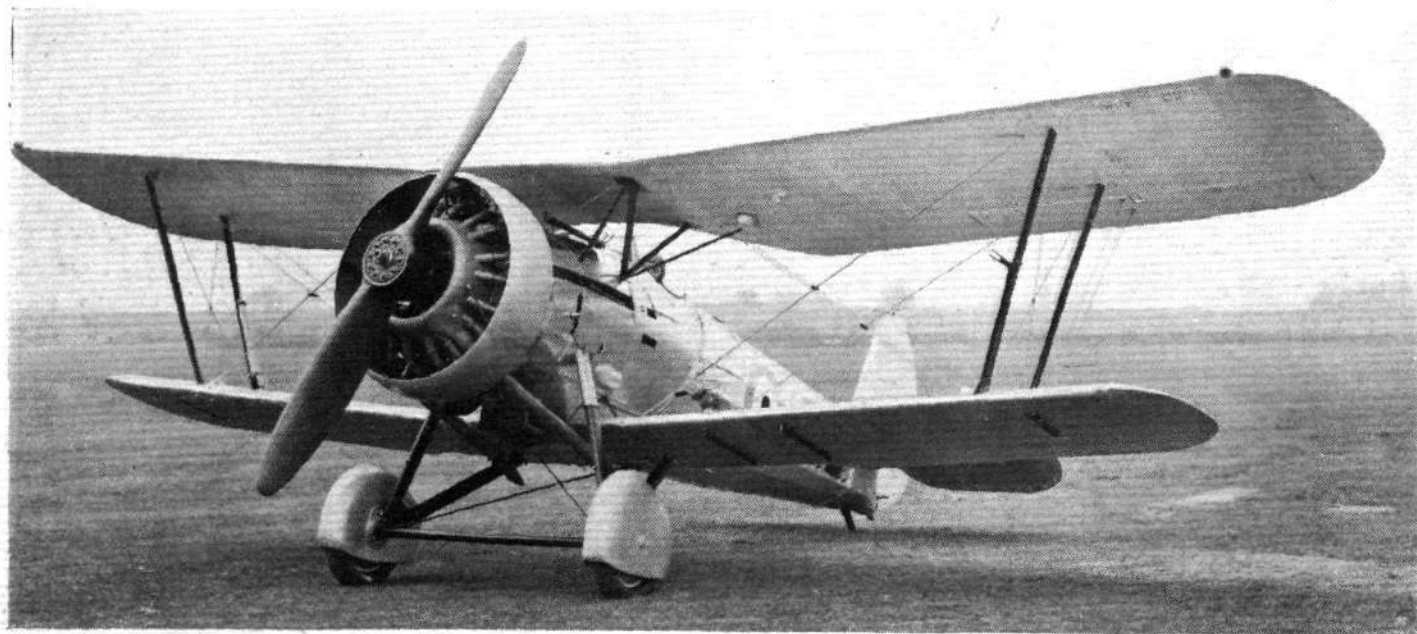
part also. Secondly, by cowling the engine with a "Townend" drag-reducing ring, the performance is still further improved. The shape of the engine has made possible the installation of a new type of exhaust collector ring, which not only gives lower drag but actually improves the cooling.

In place of double wing bracing wires the 1933 "Bulldog" has single wires of greater cross-sectional area, which again reduce drag and also vibration.

By choosing a thicker wing section (R.A.F. 34 to be more explicit) it has been possible to house the petrol tanks entirely within the wing contour, thus again reducing drag. Another result of using this wing section is that it has been possible to reduce the chord of the lower wing slightly, thereby improving the view.

Stiffer ailerons, mass-balanced, have been fitted on the new model, and each aileron hinge is self-aligning. The horn balance of the elevator has been increased in area, making the elevator lighter and smoother in operation.

All these improvements have been carried out without introducing departures from the features of design found successful in the older model.



THE BRISTOL "BULLDOG," 1933 MODEL: This is the aircraft which will be exhibited on the Bristol stand in Paris.



FAIREY "FIREFLIES" IN BELGIUM: A line-up of the machines at Nivelles. (FLIGHT Photo.)

The Fairey Aviation Co., Ltd.

TWO complete aircraft will be exhibited on the stand of the Fairey Aviation Co., Ltd., a "Fox" and a "Firefly," both fitted with Rolls-Royce Kestrel engine.

It will be remembered that after very strenuous competition with aircraft firms of other nations, the Fairey Company was awarded the Belgian order, the award causing some rather heated comment abroad, notably in France, where it was felt that the French constructors had been outwitted. The move on the part of the Fairey Company in exhibiting at Paris the two particular types of Fairey aircraft which succeeded in beating all-comers in Belgium is thus a very timely one, as it will afford not only all the foreign visitors to Paris, but the French constructors themselves, an excellent opportunity to examine the Fairey machines in detail. We believe that after such an inspection all fair-minded critics will come to the conclusion that, to use the English sporting phrase, "the best man won."

The "Fox" Mark II to be exhibited in Paris will be generally similar to those which are now being constructed under licence in the Belgian Fairey factory at Gosselies, but will show certain differences. For example, in place of the usual single synchronised machine gun firing through the propeller (and, of course, operated by the pilot) the "Fox II" shown in Paris will have two synchronised guns. In addition to these, the very comprehensive equipment includes radio, bomb gear and automatically-operated camera. In spite of the equipment carried, the "Fox II" is claimed to have a maximum speed of 190 m.p.h. (306 km./h.).

The "Firefly" to be exhibited will be of the Mark II type. Being a single-seater fighter instead of a two-seater, and having a fully supercharged engine, the "Firefly II"

is, of course, considerably faster than the "Fox II." Actually a speed of 220 m.p.h. (354 km./h.) is claimed for it at an altitude of 13,000 ft. (4 000 m.).

Both machines are of the well-known Fairey type of metal construction, and we have no doubt that both will be very much admired.

General Aircraft, Limited.

THAT one of the youngest of British aircraft firms should have achieved such success with its first machine as to be in a position to exhibit at a Paris Aero Show is cause for satisfaction. General Aircraft, Ltd., has been founded by Mr. H. J. Stieger and his associates to design and build machines incorporating the Stieger monospar principle of wing construction. The machine to be exhibited at Paris will be the first type to be produced by the firm, i.e., the Monospar ST.4. This is a four-seater aircraft intended for the private owner, and is fitted with two Pobjoy "R" engines.

The fuselage is of unusual construction in that the rear portion has a sort of monospar backbone, torsionally stiffened by pyramid bracing. The cantilever wing has the Stieger monospar construction in which a single spar is in itself strong enough to carry the pure bending loads, but is enabled to withstand torsional stresses by a system of spiral wire bracing known as pyramid bracing. The whole machine is extremely light and has an excellent ratio of gross to tare weight.

The cabin is so laid out that one passenger sits next to the pilot in front, while the other two occupy a side-by-side seat at the back. A large luggage locker is behind the rear seat. From the pilot's seat a quite remarkably good view is obtained in all directions which matter, the absence of an engine in the nose of the fuselage making



FAIREY "FOXES" IN BELGIUM: Machines lined up at Evere. (FLIGHT Photo.)



GENERAL AIRCRAFT CO.'S ST4 : A similar machine (two Pobjoy engines) will be exhibited at the Paris Aero Show. (FLIGHT Photo.)

this possible, as above photograph shows.

The main data of the Monospar ST.4 are as follows:—

Length o.a.	26 ft. 4 in. (8.03 m.)
Wing span	40 ft. 2 in. (12.24 m.)
Wing area	219 sq. ft. (20.35 m. ²)
Tare weight	1,300 lb. (590 kg.)
Disposable load	1,000 lb. (454 kg.)
Gross weight	2,300 lb. (1,043 kg.)
Maximum speed	132 m.p.h. (212 km./h.)
Cruising speed	112-115 m.p.h. (180-185 km./h.)
Range	500 miles (805 km.)
Landing speed	46 m.p.h. (74 km./h.)
Take-off run (still air)	84 yards (77 m.) in 7 seconds.
Initial rate of climb	900 ft./min. (4.58 m./sec.)
Maximum ceiling	18,000 ft. (5,486 m.)
Landing run (still air)	110 yards (101 m.)

The machine is capable of maintaining height on one engine, and of carrying out normal manœuvres with one engine out of action.

The Hawker Exhibits

THE H. G. Hawker Engineering Co., Ltd., will exhibit a "Hart" (Rolls-Royce "Kestrel"), and specimens of Hawker metal construction.

The particular "Hart" to be shown will be one which has been in service with a British Royal Air Force squadron for a considerable period, and visitors to the show will thus be able to convince themselves that the very simple and light form of construction used by the Hawker firm does not, as some might suppose, give rise to any maintenance trouble during subsequent service. The success in service, particularly from the point of view

of maintenance, ease of inspection, and facilities for executing emergency repairs, is a result of simplicity and the use of uncommon quantities of common sense in the design. Put quite briefly, it may be said that what has been done in the Hawker type of construction (which, incidentally, owes much of its extraordinary simplicity to Mr. Fred Sigrist, one of the managing directors of the firm) is to make a very special study of details which occur a large number of times in the machine. By reducing the size and weight of such details to an absolute minimum a great deal of weight has been saved, which can, and is, then utilised in making other parts sturdier than one could otherwise afford to have them.

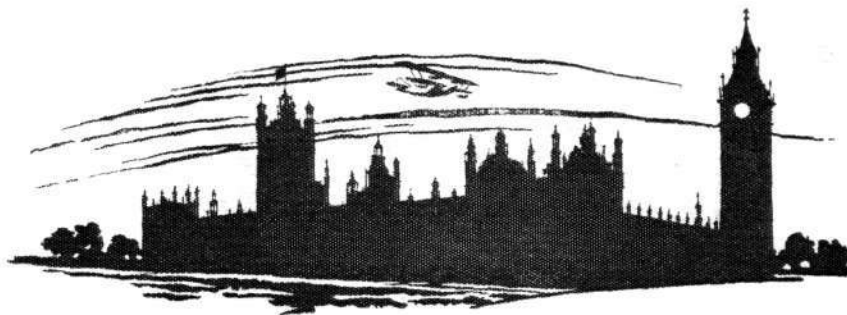
The "Hart" to be shown at Paris was flown over to Le Bourget early this week by Mr. P. W. S. Bulman, the Hawker firm's chief test pilot, and at the end of the aero show the machine will be transported back to Le Bourget and flown home to England.

In addition to the "Hart," there will be on the Hawker stand a skeleton fuselage, which will exhibit not only the typical Hawker form of construction, but which will also attract the very widest attention for another reason which visitors to the show will discover for themselves. The actual fuselage, incidentally, will be for an "Osprey" two-seater.

Samples of Hawker wing spars, ribs, and detail fittings will also be shown, and altogether one may expect that the Hawker stand will be crowded on most of the days during which the exhibition is open.



THE HAWKER "HART" : The machine to be exhibited in Paris is one which has been in service for a long period with an R.A.F. Squadron. (FLIGHT Photo.)



British Aircraft

Although the British aircraft industry will be well represented at the forthcoming Paris Aero Show, it is but a small percentage of the British aircraft firms which has taken stands in the Grand Palais, and we have therefore thought it of interest to our readers, and of value to the firms, to compile a summary of the more important types of aircraft which the British aircraft industry has to offer.

Obviously it has not been possible, in such space as we can devote to the subject in one issue of *FLIGHT*, to include full particulars of all British-built aircraft. To have done so would require several complete numbers of *FLIGHT*. But we believe that the following selection of types, and the data, etc., given for each of those types, represents a very fair picture of the wide choice which the potential aircraft purchaser has if he turns to the British aircraft industry for his supplies.

British aircraft have, during the last five or six years, gradually built up a reputation for strength and long life which is, we venture to think, unrivalled by any other nation, and the British engines with which these aircraft are equipped have a reputation which is every bit as good. In next week's issue we propose to publish particulars of British aero engines and British aero accessories.

Airspeed, Limited

Piccadilly, York

AMONG the younger British aircraft firms is that established a couple of years ago by Mr. N. S. Norway and Mr. A. H. Tiltman, under the title "Airspeed Limited." As their first aeroplane these two young men produced the small "Ferry" commercial three-engined 10-passenger biplane (p. 1079). Sir Alan J. Cobham, who is on the board of directors, wanted a machine of this class for his "National Aviation Tour" of Great Britain, and during the past summer the "Ferry" has taken up thousands of passengers.

Cheap construction, high pay load, and economical operation were the things aimed at by the designers in producing the "Ferry," which is a biplane mainly of wood construction, powered by three de Havilland engines, an inverted Gipsy III in the top wing and two Gipsy II engines outboard on the lower wings.

For Sir Alan Cobham's work a good view from the pilot's cockpit was important, and this was provided by placing the third engine in the top wing instead of in the nose of the fuselage, leaving the latter free to accommodate the pilot in the extreme front, where the view in all important directions is very good. It seems likely that the engine placing chosen also helps materially in reducing noise in the cabin.

The equipment of the "Ferry" cabin can, of course, be arranged to suit operators' requirements. For the purpose of Sir Alan Cobham's tour it was desired to carry as many "joy-ride" passengers as possible, while large petrol capacity was not essential, and the cabin was arranged to carry ten passengers. As the total horse-power of the three de Havilland engines is only 360 h.p., the power expenditure per paying passenger is only 36 b.h.p., which must represent extremely economical operation. In spite of the large pay load, the "Ferry" had no difficulty in taking off, and went through the flying season without any mishap.

The main data relating to the Airspeed "Ferry" are:

Length o.a.	39 ft. 8 in. (12.1 m.)
Wing span	55 ft. 0 in. (16.8 m.)
Wing area	641 sq. ft. (59.5 m ²)
Tare weight	3,445 lb. (1 563 kg.)
Disposable load	2,150 lb. (975 kg.)
Permissible gross weight	5,600 lb. (2 540 kg.)
Maximum speed	108 m.p.h. (173.8 km/h)
Cruising speed	85-90 m.p.h. (136-144 km/h)
Rate of climb	520 ft./min. (2.65 m/sec.)
Absolute ceiling	13,000 ft. (3 962 m.)

Armstrong Whitworth

Whitley Aerodrome, near Coventry

SIR W. G. ARMSTRONG-WHITWORTH AIRCRAFT, LTD., is one of the associated companies over which Sir John D. Siddeley presides. Other firms in the group are Armstrong-Siddeley Motors, Ltd., of Coventry, who design and build the famous aero engines, and A. V. Roe & Co., Ltd., of Manchester, who produce aircraft of their own design.

Of the types of machine produced by the Armstrong-Whitworth firm it is possible to refer here to three only. All of these incorporate the highly efficient forms of all-metal construction which the Armstrong-Whitworth firm has developed during a long period of years, the firm having been among the first to turn its attention to metal construction.

The A.W.XVI

The A.W.XVI (p. 1078) is a single-seater fighter fitted with Armstrong-Siddeley Panther engine. The fuselage is a tubular structure with bolted or pinned joints (no welding being used in the primary structure), and the wings have main spars of high tensile steel strip, but are, like the fuselage, covered with doped fabric.

The undercarriage is of the through-axle type, and the wheels are enclosed in "spats" to reduce drag. The Panther engine is provided with a Townend drag-reducing ring, and altogether the A.W.XVI is remarkable for the care which has been taken in its design to reduce drag to a minimum. The result has been that the machine achieves a performance which has been claimed to be the highest of any radial engine fighter in the world.

A petrol tank of 60 gallons (272.8 litres) is placed in the fuselage, and gives direct gravity feed to the engine.

Main data of the Armstrong-Whitworth A.W.XVI are:

Length o.a.	25 ft. (7.62 m.)
Wing span (upper)	33 ft. (10.06 m.)
Wing area	261 sq. ft. (24.25 m ²)
Gross weight	3,600 lb. (1 633 kg.)
Military load	530 lb. (240 kg.)

When the A.W.XVI is fitted with geared and super-charged Panther engine the following performances are attained:—

Max. speed at 15,000 ft. (5 000 m.)	200 m.p.h. (322 km/h.)
Speed at 25,000 ft. (8 000 m.)	187 m.p.h. (300 km/h.)
Service ceiling	29,800 ft. (9 080 m.)
Time to 20,000 ft.	14.25 min.
Time to 6 000 m.	13.75 min.



ARMSTRONG WHITWORTH "ATLAS II": The engine is an Armstrong-Siddeley Panther. (FLIGHT Photo.)

The Atlas II

Capable of being used as a two-seater fighter, as a day bomber, or as an Army Co-operation aircraft, the "Atlas II" is a development of the "Atlas I," and is fitted with Armstrong-Siddeley Panther engine. It is, of course, a two-seater, and by giving the wings a considerable sweep back it has been possible to get both the occupants far enough back, especially in view of the cut-out trailing edge, to enable them to use their parachutes in case of emergency. Structurally the "Atlas II" resembles the A.W.XVI.

With a normal tankage of 95 gallons (432 litres) of petrol, the military load is 880 lb. (400 kg.).

When the "Atlas II" is fitted with supercharged Panther engine the gross weight is 4,625 lb. (2 100 kg.), and the following performances are attained:

Max. speed at 15,000 ft.	164.5 m.p.h.
Max. speed at 5 000 m.	262 km./h.
Time to 15,000 ft.	15.5 min.
Time to 5 000 m.	17 min.
Service ceiling	23,500 ft. (7 170 m.)

The A.W.XV

Designed specially for the African sections of the Imperial Airways' route from England to Capetown, the Armstrong-Whitworth type A.W.XV, or "Atalanta" class (p. 1078), is a four-engined cantilever monoplane fitted with four Armstrong-Siddeley Double Mongoose engines of 340 b.h.p. each. The very greatest care has been taken in the design of the machine to reduce drag to a minimum, and particularly has every effort been made to avoid interference drag. This has resulted in the placing of the four engines in the leading edge of the wing in a position which extensive wind tunnel tests have shown to be the most favourable, and in arranging the undercarriage in such a way that only the faired stub axles protrude, the rest of the undercarriage structure being housed inside the fuselage.

Structurally the A.W.XV is of "mixed" construction in that its fuselage is of steel strip construction, partly covered with three-ply (the cabin portion). The cantilever monoplane wing has steel strip spars, but wooden ribs and plywood wing covering.

The cabin of the A.W.XV is designed to accommodate nine passengers. This may appear at first sight a small number for a total engine power of 1,360 b.h.p., but the explanation is to be found in the fact that it is expected that mails will form a large proportion of the pay load, while the number of passengers is not expected, for the present at any rate, to be large.

Normally the A.W.XV will carry fuel for a range of 400 miles (640 km.). The quantity of petrol and oil then carried is 1,600 lb. (729 kg.). If a smaller pay load is carried, the range is, of course, correspondingly increased. For example, with a pay load decreased to 3,500 lb. (1 590 kg.), the full tankage available gives a range of 600 miles (965 km.). For the 400 miles' range the pay load is 4,350 lb. (1 978 kg.). The cruising speed is in the neighbourhood of 120 m.p.h. (193 km./h.).

The A.W.XV has an overall length of 71 ft. 6 in. (21.80 m.), and the wing span is 90 ft. (27.45 m.). The total wing area is 1,285 sq. ft. (119.5 m.²). The certificate of airworthiness covers a gross weight of 20,000 lb. (9 100 kg.), but normally the machine will operate at a loaded weight of only 18,000 lb. (8 165 kg.). At the

latter figure the wing loading becomes 14 lb./sq. ft. (68.35 kg./m.²) and the power loading (normal) 13.25 lb./h.p.

Detailed performance figures are not available, but the maximum speed is in the neighbourhood of 140 m.p.h. (225 km./h.) and the landing speed approximately 60 m.p.h. (97 km./h.).

The considerable power reserve afforded by the four Double Mongoose engines is such that the machine should be able to maintain a relatively great height with any one of the four engines out of action, and thus freedom from forced landings should be ensured, an important consideration in a machine to be used in Africa.

Arrow Aircraft (Leeds), Ltd.

Little Russell Street, Leeds, Yorkshire

M. R. A. C. THORNTON was, until he formed his own company under above title, on the technical staff of the Blackburn Company at Brough, Yorkshire. His first, and so far his only type of aircraft is the little "Active" (p. 1071), which is designed and produced to incorporate, on a small and economical scale, the features found on modern single-seater high-performance aircraft.

The Arrow "Active," intended as an intermediate or transitional training scout machine, is an all-metal sesquiplan biplane for all stages of advanced flying training and aerobatic practice. The engine fitted can be either the Gipsy III, Hermes II.B, Hermes IV or any similar engine. In addition to serving for flying and aerobatics training, machine gun training, etc., it can be used for high-speed practice bombing, and will carry a series of nine to twelve 8½ lb. (3.9 kg.) practice bombs.

The machine has been designed to comply with the British Air Ministry's load factors for "aerobatic" flying, and includes factors of 7.5 with the centre of pressure in the forward position, 1.5 for the terminal velocity nose diving case, and 5 for inverted flight. The official tests have included all aerobatic manoeuvres, such as looping, rolling, spinning, diving, and inverted flying. Pilots report the controls to be responsive, light in action, and sufficiently sensitive to develop the correct sense of touch.

The fuselage incorporates two forms of construction. The front part is a metal *monocoque*, with light Duralumin formers and stringers and covered with Duralumin sheet plating. The rear fuselage portion is a steel tube structure, with three longerons, the whole made streamline shape by light stringers and fabric covering. Bracing is by diagonal tubes, so that no rigging is required in use.

All-metal construction (with the exception of the fabric covering) is employed, the main wing spars being round steel tubes formed into a "figure of eight" section. The constructional material used is high-tensile steel. The external wing bracing is in the form of streamline wires, and the upper and lower planes are separated by single "I" struts.

A "split" type of undercarriage is fitted, the telescopic struts having shock absorbing components in the form of coil springs and oil.

The petrol tank is mounted in the top centre section, a position which gives direct gravity feed to the carburettor.

Controls of orthodox type are employed, and the "Active" has been reported on by several pilots as being very pleasant to fly, the controls being effective and well harmonised.

No data relating to weight, etc., are available, but the following performance figures (relating to the Gipsy III model) may be quoted:—

Maximum speed	144 m.p.h. (232 km./h.)
Cruising speed	128 m.p.h. (206 km./h.)
Landing speed	50 m.p.h. (80.5 km./h.)
Take-off speed	48 m.p.h. (77 km./h.)
Climb to 10,000 ft. (3 048 m.) ..	12½ mins.
Service ceiling	20,000 ft. (6 096 m.)
Duration at full throttle ..	2½ hours
Duration at cruising speed ..	3½ hours

The Blackburn Aeroplane & Motor Co., Ltd.

Brough, East Yorkshire

MR. ROBERT BLACKBURN, the Managing Director of the firm which bears his name, is one of the pioneers of British aviation. He designed his first machines in 1909-10, and formed his own company in 1914. Ever since those early days the name Blackburn has been closely associated with British military aeronautics. It is particularly to the naval side that the Blackburn firm has devoted its energies, and such aircraft as the "Dart," "Beagle," "Nautilus" and "Ripon" have been familiar Fleet Air Arm types for a number of years.

Several years ago the Blackburn firm turned its attention to the design and construction of flying boats, and of these a whole "family" were produced, beginning with the "Iris I" and for the present ending with the "Iris V." A monoplane type, the "Sydney," was produced some years ago.

Smaller aircraft bearing the Blackburn name have also made their appearance, among them being the "Bluebird" light plane side-by-side two-seater and its modern version the B.2 Trainer. The Blackburn "Lincock" is a low-powered single-seater light fighter with high performance and extraordinary manoeuvrability, but economical to operate.

The latest aircraft to be produced by the Blackburn firm are two civil types, designed to the order of the British Air Ministry for the purpose of testing out the relative advantages of the biplane and monoplane. These two machines, which are at the present time at the Martlesham Experimental Establishment for thorough performance tests, were designed to have the same range, pay load, power plant and passenger accommodation. The fuselages of the two types are identical, as are also the two undercarriages, and the only differences are to be found in the arrangement of the wings and engines. Both are twin-engined machines, and both were designed to operate from aerodromes situated at considerable altitudes, such as are to be found on sections of the Cairo-Capetown air route.

In general structural principles used, the two Blackburn civil machines are also similar, *i.e.*, the fuselage is a semi-monocoque metal structure, with "Alclad" corrugated sheet covering, and the wings have metal spars and ribs, but fabric covering.

The engines in both types are Armstrong-Siddeley Jaguar IV C. In the biplane (p. 1071) they are mounted outboard on special gap struts, and in the monoplane (p. 1070) they are carried ahead of the leading edge of the wing, with fairings merging the lines into the wing surfaces. The petrol tanks, with a capacity of 170 gall. (773 litres) are housed inside the wing of the monoplane and in the top centre section of the biplane.

The cabins of both machines have seating accommodation for 10 passengers, seated in comfortable chairs along the sides of the cabin. Large windows give light and view, and the windows have been so arranged that in case of emergency they can be removed entirely, thus providing extra emergency exits for the passengers.

In the cockpit in the nose of the fuselage are two seats side by side, the intention being that a crew of three should be carried: chief pilot, assistant pilot, and wireless operator. As there is no engine in the nose of the fuselage, and very large windows and windscreens are provided, the view obtained by the pilots is exceptionally good in all directions which matter.

The biplane wing arrangement is the orthodox British one, with one pair of interplane struts on each side in addition to the gap struts which carry the engines. The monoplane has a semi-cantilever wing, the external bracing struts reaching out approximately half-way from the fuselage to the wing tips.

The main dimensions, etc., of the Blackburn civil biplane are as follows:

Length, o.a.	..	54 ft. 8 in. (16.7 m.).
Wing span	..	64 ft. (19.5 m.).
Wing area	..	1,037 sq. ft. (96.4 m. ²).
Gross weight	..	12,145 lb. (5,518 kg.).
Pay load	..	2,340 lb. (1,061 kg.).
Fuel	..	1,392 lb. (632 kg.).

The corresponding figures for the monoplane are:

Length o.a.	..	54 ft. 8 in. (16.7 m.).
Wing span	..	86 ft. (26.2 m.).
Wing area	..	1,068 sq. ft. (99.1 m. ²).
Gross weight	..	12,580 lb. (5,707 kg.).
Pay load	..	2,340 lb. (1,061 kg.).
Fuel	..	1,339 lb. (607 kg.).

The cruising range of both machines is approximately 350 miles (563 km.), and the estimated cruising speed is in the neighbourhood of 110 m.p.h. (177 km./h.).

Boulton & Paul, Ltd.

Norwich, Norfolk

BOULTON & PAUL, LTD., of Norwich, was one of the firms which came into the British aviation industry during the war, but, unlike so many others, the firm kept up, and indeed increased, its aviation department after the war. It was one of the first British firms to concentrate upon all-metal construction of aircraft, and a large number of patents bearing the names of the firm and its chief engineer, J. D. North, deal with forms of metal aircraft construction.

For a large number of years Boulton & Paul specialised on military types, and their "Sidestrand" was the first British high-performance twin-engined day bomber to be issued to the R.A.F. The "Sidestrand III" (p. 1071) is the latest version of this machine, and is like all Boulton & Paul military types of all-metal construction. In the fuselage steel tubular construction is used, and the wings have spars and ribs of high-tensile steel. The engines fitted are Bristol Jupiter VII.F.

In aerodynamic design the "Sidestrand III" is remarkable for its large span, slender fuselage and careful streamlining.

Following are the most important data relating to the "Sidestrand III":—

Wing span	..	72 ft. (21.95 m.).
Wing area	..	980 sq. ft. (91 m. ²).
Tare weight	..	6,010 lb. (2,723 kg.).
Fuel	..	230 gallons (1,048 litres) = 1,780 lb. (809 kg.).
Military load	..	2,180 lb. (990 kg.).
Gross weight	..	10,200 lb. (4,636 kg.).
Max. speed at 5,000 ft. (1,525 m.)	..	140 m.p.h. (225 km./h.).
Landing speed	..	54 m.p.h. (87 km./h.).
Climb to 10,000 ft. (3,050 m.)	..	10.3 min.
Service ceiling	..	24,000 ft. (7,320 m.).
Range	..	750 miles (1,200 km.).

Boulton & Paul P.32

The P.32 is a three-engined night bomber designed to meet the requirements of the British Air Ministry. It is in some respects a development of the "Sidestrand," but differs from it in actual dimensions, and also in that it has three instead of two engines. The placing of the third engine is unusual (see photo below) and has many practical advantages, such as free field of fire for the front gunner, good view for the pilot, and reduced vibration throughout the fuselage. Yet another advantage is that the placing of the third engine on the top centre section makes the installation of this engine identical with those of the two lower engines. The engines used are Bristol Pegasus moderately supercharged, rated at 555 b.h.p. at 4,500 ft. (1,372 m.).



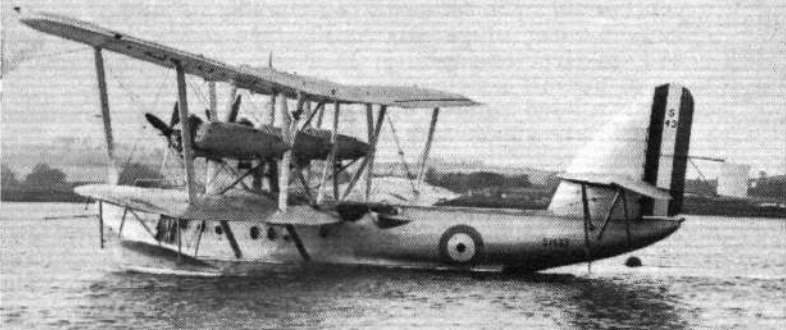
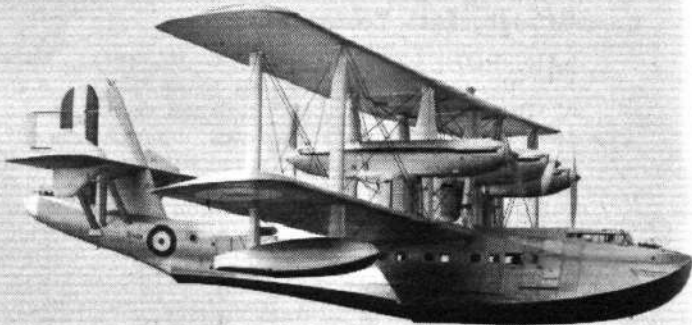
A NEW NIGHT BOMBER: The Boulton & Paul "P.32" is fitted with three Bristol Pegasus engines. (FLIGHT Photo.)

SOME REPRESENTATIVE

HAWKER "NIMROD"



SHORT R6/28



SHORT "RANGOON"



SHORT "CALCUTTA"



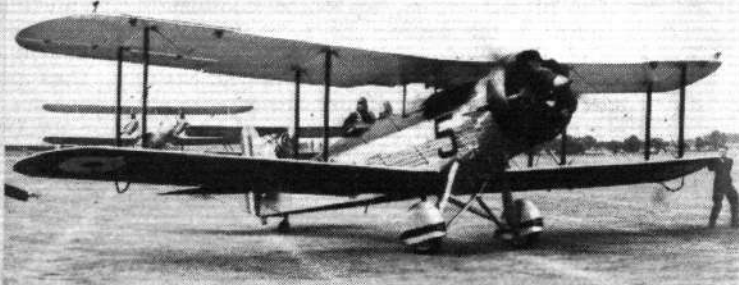
DE HAVILLAND "TIGER MOTH"



AVRO "MAILPLANE"



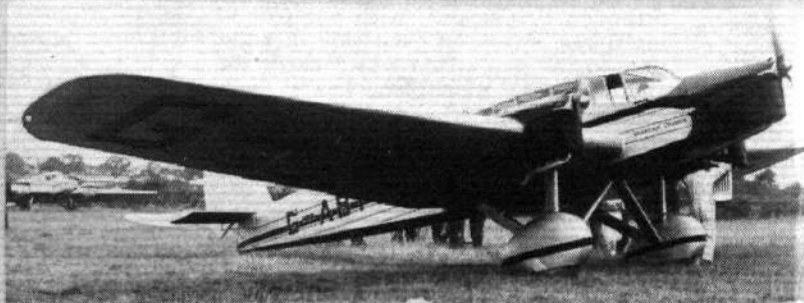
BLACKBURN CIVIL MONOPLANE



WESTLAND "WALLACE"



VICKERS "VILDEBEEST"



SPARTAN "CRUISER"

BRITISH AIRCRAFT

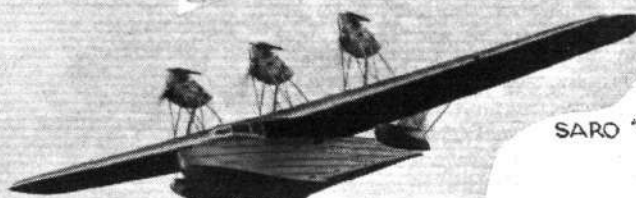
BOULTON & PAUL
"SIDESTRAND"



G-AAJY



SHORT "VALETTA"



SARO "WINDHOVER"



SARO "CLOUD"



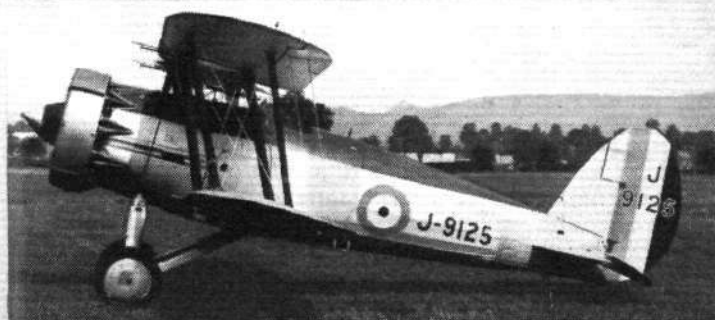
SARO "SEVERN"



ARROW "ACTIVE"



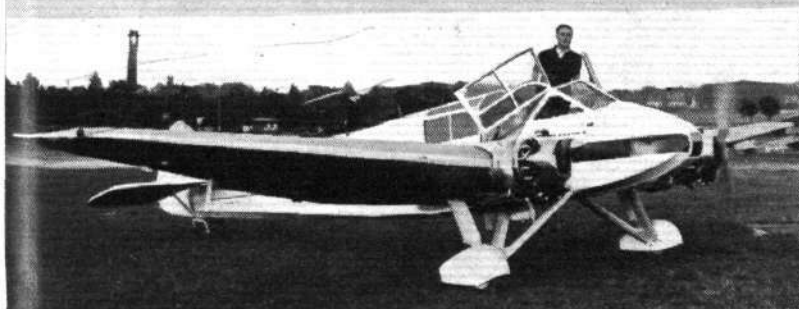
VICKERS "JOCKEY"



GLOSTER S.S.19



BLACKBURN CIVIL BIPLANE



MONOSPAR S.T.4.



PARNALL "ELF"

Below we give such data of the P.32 as it is permissible to publish:—

Length o.a.	..	..	..	69 ft. (21.2 m.)
Wing span	..	..	..	100 ft. (30.5 m.)
Wing area	..	..	..	2,090 sq. ft. (194 m. ²)
Weight fully loaded	..	..	..	22,700 lb. (10 300 kg.)

The P.64

When the British Air Ministry issued a specification for a mailplane more than a year ago, it was stipulated that to be adopted the machine must carry a mail load of 1,000 lb. (454 kg.) over a distance of 1,000 miles (1 610 km.) at a cruising speed of at least 150 m.p.h. (241 km./h.). The Boulton & Paul P.64, which was the design selected, has an estimated cruising speed of 172 m.p.h. (275 km./h.), a maximum speed at 5,000 ft. of 195 m.p.h. (314 km./h.) and a range, with normal tanks, of 1,250 miles (2 000 km.).

The P.64 carries a crew of two, and is capable of level flight on one engine at 5,000 ft. (1 525 m.). At a cruising speed of 150 m.p.h. the engines are throttled down to approximately half of their power, under which conditions they should be singularly free from breakdown.

The undercarriage has been very carefully designed, and calculations showed that the extra fuel to be carried to overcome the undercarriage drag is less than would be the extra weight of a retractable undercarriage. A fixed undercarriage was, therefore, chosen.

Structurally the P.64 is similar to other Boulton & Paul machines, and is of all-metal construction. The two engines with which it will be equipped are Bristol Pegasus I M.2. They are mounted high in the gap, and are provided with Boulton & Paul Townend drag-reducing cowlings.

The cabin for pilot and navigator is in the nose of the fuselage. Behind it is the wireless and navigation compartment, and aft of that again the mail compartment.

The principal data relating to the Boulton & Paul Mailplane are:—

Length o.a.	..	..	..	42 ft. 6 in. (13.3 m.)
Wing span	..	..	..	54 ft. (16.45 m.)
Wing area	..	..	..	756 sq. ft. (70 m. ²)
Tare weight	..	..	..	6,125 lb. (2 780 kg.)
Disposable load	..	..	..	4,375 lb. (1 990 kg.)
Gross weight	..	..	..	10,500 lb. (4 770 kg.)
Absolute ceiling	..	..	..	25,000 ft. (7 620 m.)

The Bristol Aeroplane Co., Ltd.

Filton, Bristol

AMONG the oldest of British aircraft firms is the Bristol Aeroplane Co., Ltd. It was founded in 1910 by the late Sir George White, Bart., and his brother, Mr. Samuel White. The original title of the firm was "The British & Colonial Aeroplane Company," the present title of the firm having been adopted a few years ago. The Bristol Company began by building biplanes of the Farman "box kite" type, but it was not long before the firm commenced to do original designs, and among its early designers one finds such famous names as Prier, Gordon England, Coanda. The present chief designer of the company is Capt. F. S. Barnwell, who has been with the firm since before the war, and who was, when he joined the Bristol firm, already a designer of more than average ability, having designed and built, in collaboration with his brother, the late Mr. Harold Barnwell, a monoplane of very unorthodox design in the earliest days of British aviation.

Of recent years the Bristol Company has, perhaps, become more widely known throughout the world for its famous aero engines, designed under the guiding genius of Mr. Roy Fedden, and which have been in use by nearly all European nations which possess an air force.

Some years ago the Bristol Aeroplane Company produced the "Bulldog" single-seater fighter, which was quickly adopted by the British Royal Air Force and which is now the standard equipment of a large number of R.A.F. Fighter Squadrons. The very latest version of the "Bulldog," the 1933 model, will be exhibited at the forthcoming Paris Aero Show, and for the

details of this reference should be made to page 1064 of this issue, where it is described in considerable detail. Here it will suffice if we recall that the Bristol firm has evolved, under the leadership of Mr. H. J. Pollard, who is in charge of experimental metal construction, forms of construction peculiar to the Bristol Company. In the fuselage the Bristol type of construction uses steel strip where most other British firms use steel tube. The strip is formed into various sections, and joints between longerons and struts are made by riveting. In the wing structure steel strip is also used, but is, of course, of different sections. When the type of construction was first evolved by Mr. Pollard for the fuselage, there were those who foresaw trouble from the very thin gauge of metal used, but subsequent service in the R.A.F. by a large number of "Bulldogs" has shown that maintenance is certainly no more difficult than with other forms of construction. The thin gauges used have been made to stand up remarkably well, not only to what one might call legitimate stresses, but also such knocks as are inevitably received during handling on the ground.

A most interesting experimental monoplane wing portion was designed and built by the Bristol Company some years ago. In this type of construction use is made of multi spars, and of wing ribs as ordinarily understood there are none. The wing covering is of metal, and experiments with steel sheet covering have given some very interesting results, which will doubtless be incorporated in actual aircraft later. For the present the main object is to accumulate sufficient test data to obtain an idea of the sort of stresses which are set up in the covering, and the way the covering panels behave under these stresses.

In addition to the "Bulldog" the Bristol Company also produce a general purpose aircraft known as the type "120." This machine can be used for fighting, bombing, Army co-operation, photography, and as an ambulance. Structurally the "120" is generally similar to the "Bulldog," but the wing bracing is by diagonal struts. The rear gunner is protected from the wind by a transparent and revolving gun turret. The engine is a Bristol Pegasus M.2.

The dimensions, etc., of the Bristol "120" are:—

Length o.a.	..	..	..	34 ft. 0 in. (10.4 m.)
Wing span (upper)	..	..	..	40 ft. 8 in. (12.4 m.)
Weight empty	..	..	..	3,632 lb. (1 650 kg.)
Petrol and oil	..	..	..	890 lb. (405 kg.)
Military load	..	..	..	678 lb. (308 kg.)
Total loaded weight	..	..	..	5,200 lb. (2 360 kg.)

Performance figures are not available.

The Cierva Autogiro Co., Ltd.

Bush House, London, W.C.2

SENOR JUAN DE LA CIERVA is a Spanish engineer who several years ago conceived the idea of a non-stalling aircraft in which the lift was obtained not from one or more fixed wings but from a rotor with blades free to revolve under the action of the air forces on them. He has had a long and difficult fight to convince the world of the soundness of his ideas, but with a persistence which must receive the most unstinted admiration he has continued to experiment, and it can now be said that the experimental stage is passed and the commercial stage has arrived. The various problems met with in the earlier machines have been overcome, and the Cierva



A GENERAL PURPOSE MACHINE : The Bristol Type "120" (Bristol Pegasus). Note the transparent gun turret. (Flight Photo.)

Company feel justified in placing their machines on the market.

Two models of the Autogiro are available at present in Great Britain, the type C.19 Mark IV and the C.24.

The C.19 Mark IV

Fitted with an Armstrong-Siddeley Genet engine of 100 h.p. this machine is an open two-seater with steel tube fuselage and three-bladed rotor. The fixed wing is mainly of wood construction. The rotor blades have steel tube spars, while the aerofoil section used is formed by solid Balsa wood having a Spruce core. The rotor hinges have been so designed that for housing the machine two of the blades can be folded back, when the space occupied by the machine is reduced to that required to accommodate the fixed wing.

The undercarriage is of wide track and of the "split" type, incorporating oleo legs of 9½-in. travel. Dunlop wheels are fitted and low-pressure tyres. The wheel brakes are Bendix.

The normal petrol tankage is of 16 gallons (72.7 litres), which gives a range of 230 miles (370 km.).

The main data are:—

Rotor diameter	..	..	34 ft. (10.4 m.)
Span of fixed wing	..	..	21 ft. (6.4 m.)
Tare weight	..	..	1,075 lb. (490 kg.)
Normal gross weight	..	..	1,450 lb. (660 kg.)
Max. gross weight	..	..	1,550 lb. (705 kg.)
Maximum speed	..	..	102 m.p.h. (164 km./h.)
Cruising speed	..	..	90 m.p.h. (145 km./h.)
Minimum speed	..	..	25 m.p.h. (40 km./h.)
Rate of climb	..	..	630 ft./min. (3.2 m./sec.)

The C.24

The C.24 Autogiro is a cabin two-seater fitted with de Havilland Gipsy III inverted engine. The front portion of the fuselage is a welded steel tube structure, while the rear portion is of wood construction. The rotor construction is the same as that of the C.19, and like it the rotor is started by the engine via a clutch mechanism. When the rotor has attained a speed of 200 r.p.m. (which it does in something like 45 sec.), the rotor is declutched from the engine and the wheel brakes released for the take-off run. A rotor brake is fitted, and is of the internal expanding type. By means of this brake the rotor can be stopped quickly after landing, thus reducing the likelihood of the machine being blown over by a strong wind. The pilot and passenger sit in tandem inside a small but quite comfortable little cabin, and the view from the pilot's seat is very good.

The principal data of the C.24 are:—

Rotor diameter	..	..	34 ft. (10.4 m.)
Fixed wing span	..	..	19 ft. 6 in. (5.95 m.)
Tare weight	..	..	1,280 lb. (582 kg.)
Normal gross weight	..	..	1,705 lb. (775 kg.)
Max. gross weight	..	..	1,800 lb. (818 kg.)
Maximum speed	..	..	115 m.p.h. (185 km./h.)
Cruising speed	..	..	100 m.p.h. (161 km./h.)
Minimum speed	..	..	25 m.p.h. (40 km./h.)
Take-off run	..	..	50 yards (45.7 m.)
Range at cruising speed	..	..	350 miles (563 km.)

A recent development of the Autogiro is the wingless type, in which the fixed wing has been suppressed and all the lift is provided by the rotor. In this type also

the ailerons and elevator have disappeared, their function being carried out by tilting the rotor head direct. Shortly a small, cheap version of this type of Autogiro is to be placed on the market by Air Commodore J. G. Weir, whose company is building the new type in their Glasgow works. Few details of the new Autogiro are available, but it is to be equipped with a new engine of about 40 h.p., and it is hoped to place the machine on the market at a very low price.

At the Paris Aero Show the Liore & Olivier firm will exhibit one of their wingless Autogiros fitted with Pobjoy engine. This machine, illustrated in FLIGHT recently, is a side-by-side two-seater.

The Comper Aircraft Co., Ltd.

Hooton Park Aerodrome, Cheshire

ALTHOUGH other designs are on the way, the Comper Aircraft Company has at the present time but two aircraft types actually on the market, the "Pobjoy Swift" and the "Gipsy Swift." A modified version of the "Pobjoy Swift" is the commercial "Swift."

The original "Swift" was designed for the A.B.C. "Scorpion," and was offered for a time as an alternative to the "Pobjoy Swift." Now, however, the "Pobjoy Swift" (p. 1079) is regarded as the standard machine. It is a small single-seater specially intended for the private owner who wants good performance. It is mainly of wood construction, with a relatively few steel fittings at highly stressed points. The fuselage has a curious fin back to which the wing halves are attached, and consequently the view straight ahead is obstructed. The angle is, however, so small that this is not important, and the pilot can, by leaning his head slightly to one side or other, look straight ahead.

The monoplane wing is strut braced and has a neat folding arrangement which does not require jury struts to brace the wing in the folded position.

A very neat undercarriage is fitted, using Goodyear air-wheels as standard. The shock-absorbing system is housed inside the fuselage.

Main data of the Comper "Pobjoy Swift" are as follows:—

Length	..	..	18 ft. 4 in. (5.6 m.)
Wing span	..	..	24 ft. (7.3 m.)
Wing area	..	..	90 sq. ft. (8.36 m. ²)
Tare weight	..	..	540 lb. (245 kg.)
Weight loaded (Aerobatic)	..	..	780 lb. (354 kg.)
(Normal)	..	..	985 lb. (447 kg.)
Cruising speed	..	..	120 m.p.h. (193 km./h.)
Landing speed	..	..	40 m.p.h. (64 km./h.)
Range (standard tankage of 15 gallons = 68 litres)	..	..	380 miles (611 km.)
Take off	..	..	60 yards (55 m.)
Pull up	..	..	80 yards (73 m.)
Initial rate of climb	..	..	1,400 ft./min. (7 m./sec.)
Service ceiling	..	..	22,000 ft. (6,725 m.)

The "Gipsy Swift" (p. 1078) is similar to the standard "Swift" in almost all its details except engine installation. It will therefore suffice if we tabulate its main performance figures, which are impressive:—

Max. speed	..	165 m.p.h. (266 km./h.)
Cruising speed	..	140 m.p.h. (225 km./h.)
Landing speed	..	50 m.p.h. (81 km./h.)
Initial rate of climb	..	1,400 ft./min. (7 m./sec.)
Ceiling	..	20,000 ft. (6,092 m.)
Range (on 22 gallons = 100 litres)	..	400 miles (644 km.)

A commercial model of the "Pobjoy Swift" is intended for feeder line air mail work, survey or communications. Its tare weight is 540 lb. (245 kg.) and its disposable load 530 lb. (241 kg.), giving a gross weight of 1,090 lb. (495 kg.). When the tankage is 15 gallons (68 litres) the range is about 380 miles (611 km.) and the pay load 225 lb. (102 kg.).

If the tank capacity is increased to 25 gallons (114 litres) the range is increased to 630 miles (1,000 km.) and the pay load decreased to 115 lb. (53 kg.).



TWO "AUTOGIROS": On the left the C.24 (Gipsy III) and on the right the C.19 Mark IV (Armstrong-Siddeley Genet). (FLIGHT Photo.)

The De Havilland Aircraft Co., Ltd.

Stag Lane, Aerodrome,
Edgware, Middlesex

CAPT. GEOFFREY DE HAVILLAND is one of the oldest (aeronautically speaking) British aircraft designers, having designed his first aircraft somewhere around 1908, and having been actively engaged on aircraft design and construction ever since. The present company has been in existence since shortly after the war, and has branches in many of the Dominions overseas.

It was the "Moth" which started the de Havilland Company on its post-war career as specialists in civil aircraft, and more particularly in aircraft suitable for the private owner, and more "Moths" have been built and flown over the world than any other type of aeroplane.

The standard "Moth" with Gipsy II engine is already a familiar sight in almost any country, and needs no description here. A fairly recent version of it is the Gipsy III "Moth," which is offered as an alternative to, and not as a substitute for, the older model. The Gipsy III "Moth" is fitted with the inverted Gipsy III engine, and the view forward is thereby greatly improved. The very clean nose also improves the performance somewhat.

"Tiger Moth"

Designed for economical training, the "Tiger Moth" (Gipsy III) (p. 1070) can be used for flying training, and for training in bombing, wireless, etc., as well as for gunnery training with camera gun. Structurally the machine is of composite construction, with welded steel tube fuselage and wooden wings. The wings are slightly staggered and swept back, so that both occupants can use their parachutes. The rear lift wires are anchored at their lower ends near the lower front spar attachments, so that they do not interfere with getting into or out of the front cockpit.

When the "Tiger Moth" is used for flying training, it has a tare weight of 1,075 lb. (488 kg.) and a gross weight (in acrobatic category) of 1,650 lb. (750 kg.). As an observation aircraft, with camera and wireless, the tare weight is the same, but the maximum permissible gross weight is then 1,825 lb. (828 kg.). The same weight figures apply when the machine is used as above, but carrying three 20-lb. bombs.

By fitting an extra 10-gall. tank and equipping the machine with four 20-lb. bombs, it becomes a light bomber, still retaining the same weight figures. Finally, by removing the front seat and installing a camera gun the "Tiger Moth" becomes suitable for single-seater fighter training. Weights: Tare, 1,075 lb. (488 kg.); gross (aerobatic), 1,650 lb. (750 kg.). The machine can also be supplied with floats and used for seaplane training. At a gross weight of 1,643 (745 kg.) the "Tiger Moth" has a maximum speed of 109 m.p.h. (175 km./h.) and an initial rate of climb of 700 ft./min. (3.6 m./sec.).

"Puss Moth"

The "Puss Moth" (Gipsy III) is by now familiar to everyone, and is a 2/3-seater designed for the private owner. It has steel tube fuselage and wooden wings which fold, and is of the cabin type, with large windows giving view, light and air. Its main data are:

Length o.a.	25 ft. (7.6 m.)
Wing span	36 ft. 9 in. (11.2 m.)
Wing area	222 sq. ft. (20.6 m ² .)
Tare weight	1,265 lb. (575 kg.)
Disposable load	785 lb. (357 kg.)
Gross weight	2,050 lb. (932 kg.)
Maximum speed	128 m.p.h. (206 km./h.)
Cruising speed	108 m.p.h. (174 km./h.)
Range (20 gal. = 91 litres)	380 miles (612 km.)
Range (35 gals. = 159 litres)	665 miles (1 070 km.)

"Fox Moth"

Designed as a "family machine," or for air taxi work, etc., the "Fox Moth" (Gipsy III) (p. 1079) is mainly of wood construction, and is remarkable for the high ratio of gross weight to tare weight. In its standard form the



THE DE HAVILLAND "PUSS MOTH": The engine is a Gipsy III.
(FLIGHT Photo.)

machine has seating for the pilot in a cockpit behind the wings and three passengers in the cabin. If desired it can be supplied with four seats in the cabin, but the accommodation is then slightly cramped.

Three standard tankages are provided: 25 gall. (114 litres), 40 gall. (182 litres) and 50 gall. (228 litres). The total permissible weight is 2,070 lb. (940 kg.), and the range will, of course, depend upon the tankage. The pay load also depends upon the tankage, and is 605 lb. (276 kg.) for the smallest tankage and 391 lb. (179 kg.) for the largest tankage. The range varies from 438 miles (705 km.) to 876 miles (1 410 km.).

When the "Fox Moth" is fitted with the Gipsy III engine, the maximum speed is 108.5 m.p.h. (175 km./h.) and the cruising speed 92 m.p.h. (148 km./h.). If the new Gipsy Major engine is fitted, the maximum speed is increased to 113 m.p.h. (182 km./h.) and the cruising speed to 96 m.p.h. (155 km./h.).

The Fairey Aviation Co., Ltd.

Hayes, Middlesex

MR. C. R. FAIREY holds in Great Britain a position somewhat similar to that occupied in France by M. Louis Breguet in that his company has produced probably a greater number of general purpose aircraft than any other firm, not only for use in Great Britain, but in a large number of other countries. Some years ago Mr. Fairey introduced the "Fox," which set a new fashion in high-performance two-seaters, and which led later to the design and production of the now famous III.F which has been used for a variety of purposes in many countries, and has been fitted with many different types of engine.

At the Paris Aero Show the Fairey Company will exhibit the latest type of "Fox," similar to the model with which squadrons of the Belgian Air Force are now being equipped, and a "Firefly II.M" which also has been adopted by the same Air Force.

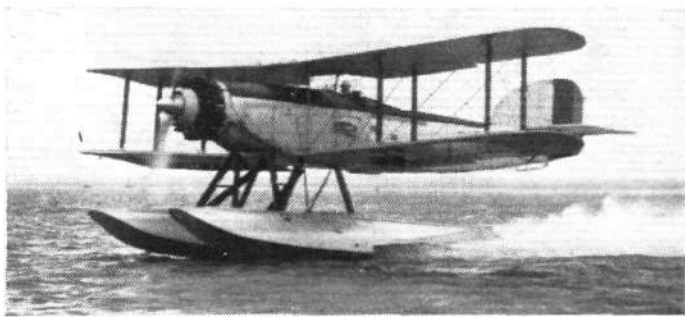
The "Fox" Mark II is an all-metal two-seater, and can be used as a day bomber, fighter or reconnaissance aeroplane. The engine fitted is a Rolls-Royce "Kestrel," and when the load carried by the "Fox II" is 1,800 lb. (820 kg.), the aircraft has a speed range of 48 m.p.h. (77 km./h.) to 190 m.p.h. (306 km./h.). By means of the special heating arrangements the cockpits are maintained at a reasonable temperature up to the service ceiling, which is 29,000 ft. (8 850 m.). The span of the "Fox II" is 38 ft. (11.6 m.) and the overall length is 29 ft. 5 in. (7.45 m.).

"Firefly II.M"

The "Firefly" Mark II.M is designed to combat high-performance day bombers and single-seater fighters, and combines extraordinary climbing powers with great manoeuvrability at high speeds at all altitudes. The engine is a Rolls-Royce Kestrel supercharged, which is claimed to give the "Firefly" a speed of 220 m.p.h. (354 km./h.) at an altitude of 13,000 ft. (4 000 m.). As in the "Fox" so in the "Firefly" are special cockpit heating arrangements employed, which successfully overcome extreme cockpit temperatures right up to the service ceiling of the machine, which is 31,000 ft. (9 450 m.). The main dimensions of the "Firefly" are:—Span, 30 ft. 8 in. (9.35 m.); overall length, 24 ft. 6 in. (7.47 m.); height, 9 ft. 6 in. (2.9 m.).



THE FAIREY "GORDON": A two-seater day bomber with Armstrong-Siddeley Panther engine.



The "Gordon" as a Seaplane.

A development of the famous Fairey IIF, the "Gordon" has an Armstrong-Siddeley Panther engine instead of a water-cooled. The machine is used by the R.A.F. as a day bomber, but belongs to the "general purpose" class, and can be used also for army co-operation. As a day bomber the "Gordon" has a gross weight of 5,900 lb. (2 680 kg.) and a speed at 10,000 ft. (3 000 m.) of 132 m.p.h. (213 km./h.).

General Aircraft, Limited

Air Port of London, Croydon, Surrey

AS General Aircraft, Ltd., are exhibiting one of their Monospar St.4 monoplanes at the Paris Aero Show, and this is dealt with elsewhere in this issue, it may be preferable to deal here with the Monospar principle of wing construction rather than with any particular machine in which this system is used.

The single-spar wing was invented by Mr. H. J. Stieger, who is now managing director and chief designer of the Monospar Company and of General Aircraft, Ltd. Mr. Stieger is a Swiss by birth, but most of his aeronautical career has been spent in England, and the headquarters of his companies are in London.

The general principle of the Stieger Monospar wing is simplicity itself, and consists, briefly explained, of a single main spar, which may be of metal or wood construction and of any form desired, such as a box spar, an I-section beam, or any other type which will support the bending loads arising from the lift on the wing. This single spar is designed to resist bending loads only, and would be very weak in torsion. The torsional strength of a Monospar wing is supplied by a system of bracing, which may be in the form of wires, cables, tie rods, or any other member capable of resisting tension loads. This system has been termed "pyramid" bracing because it is supported at leading and trailing edges on suitable struts, the ends of which form supports for the apices of the four wires meeting at that point. Where the wires cross over the spar they are attached to the top and bottom flanges of the spar by substantial steel wiring plates.

The "pyramid bracing" of a Monospar wing may be pictured as two spirals wrapped around the wing in opposite directions, one set resisting loads due to a forward movement of the centre of pressure and the other a rearward movement.

It will be realised that ultimately the inner ends of the pyramid bracing must be attached to the fuselage. Also that the plain pyramid bracing is not capable of taking drag and anti-drag loads. Separate wires parallel with the wing span can be used as drag and anti-drag members, but it is also possible to make the leading edge itself strong enough to serve either as the drag wire, and to have an anti-drag wire at the rear ends of the pyramid struts, or even to make the leading edge strong enough in comparison to take both drag and anti-drag loads.

A considerably lighter wing structure is claimed to be possible by using Monospar construction, and some time ago a Monospar wing was built for a Fokker F.VII-3m. monoplane to test out the theory. The designers claim that on the Fokker wing a weight saving of 39 per cent. was made, which resulted in an increase of 37 per cent. in pay load. That large wing is still undergoing official tests for the British Air Ministry.

The Gloster Aircraft Co., Ltd.

Hucclecote, Gloucestershire

PERHAPS the Gloster Aircraft Co., Ltd., has become best known throughout the world at large through its strong air racing policy, which began with the company designing and building the famous "Bamel" racer, and was continued through Schneider Trophy seaplanes, (biplanes and monoplanes) up till recent times. The firm has, however, designed and built a large number of types adopted at one time or another by the British R.A.F. Quite recently the firm showed that its experience of small high-performance single-seaters had not interfered with its ability to produce large aircraft, and the Gloster Troop Carrier biplane saw the light of day. This machine is of all-metal construction, and has a metal monocoque fuselage in which an excellent streamline shape is achieved with Duralumin plating. The fuselage is, in fact, built exactly like the hull of a flying-boat. Four Rolls-Royce Kestrel engines are placed in tandem pairs between the wings, and this engine arrangement helps to retain the clean lines and small frontal area of the machine. As the Troop Carrier is still undergoing tests nothing may be said of its performance.

The S.S.19

Another interesting Gloster type is the S.S.19, which is a single-seater fighter carrying a formidable armament in the form of six machine guns. Probably this was the first aircraft in the world to be so equipped. Two guns are placed in the fuselage in the ordinary position, and the other four are placed in the wings, just outside the airscrew disc. The fuselage guns are Vickers and the wing guns Lewis. The guns are so mounted in the machine as to converge their fire at a point 150 yd. ahead of the aircraft, and thus provide a "cone of fire," thereby greatly increasing the chances of a hit.

The S.S.19 (page 1071) is a two-bay biplane, the two-bay arrangement having been chosen on account of the guns mounted in the wings in order to give greater wing rigidity. The engine is a Bristol Jupiter Series VII.F, giving 480 b.h.p. at 9,000 ft. (2 745 m.). The machine is of all-metal construction, with steel tubular fuselage and wings having spars formed from high-tensile steel strip. The covering is fabric.

The S.S.19 carries, in addition to its six machine guns, an armament of four 20-lb. bombs.

During tests at Martlesham Heath Experimental Establishment the S.S.19 was put through every conceivable manoeuvre and was repeatedly put into terminal velocity nose dives, when it attained speeds of 320 m.p.h. (515 km./h.).

Following are the performance figures for the Gloster

S.S.19 when fitted with the Bristol Jupiter VII.F engine:—

<i>Speed at:</i>		
Ground level	.. ..	175 m.p.h. (282 km./h.)
10,000 ft. (3 050 m.)	.. ..	203 m.p.h. (337 km./h.)
15,000 ft. (4 570 m.)	.. ..	207 m.p.h. (334 km./h.)
20,000 ft. (6 100 m.)	.. ..	185 m.p.h. (298 km./h.)
<i>Climb to:</i>		
5,000 ft. (1 525 m.)	.. ..	3 min. 40 sec.
15,000 ft. (4 570 m.)	.. ..	10 min. 0 sec.
20,000 ft. (6 100 m.)	.. ..	13 min. 54 sec.
Service Ceiling	.. ..	30,000 ft. (9 150 m.)

Handley Page, Limited

Cricklewood, London, N.W.2

FOR a great number of years the name of Handley Page has been associated in the public mind at home and abroad with two things: Large aircraft and slots. The first large Handley Page machine made its appearance during the war, and was known as the type 0/400. Since those early days the Handley Page firm has rather made a speciality of large aircraft, of which considerable numbers and many types have been in service, commercial as well as military aircraft. Space does not permit of referring here to more than one representative of each class.

H.P. 42 (p. 1079)

When Imperial Airways, Ltd., made the decision to concentrate on large aircraft as the most economical type to operate, and the type which promised the greatest degree of comfort for the passengers, Handley Page, Ltd., were awarded the order. The design was for a large four-engined biplane, and showed considerable originality, not only in the aerodynamic layout but in the structural methods adopted. The first order was for eight machines, and it was a bold step for all concerned to embark upon such an ambitious scheme with an as yet untried design. However, the work went forward, and, apart from certain "teething troubles" with the first machine, the "Hannibal," the H.P. 42 class proved a success, and is now one of the most popular types of civil aircraft in Europe.

Several forms of construction are used in the H.P. 42. The forward and middle portion of the fuselage is a metal-covered structure, while the rear portion is of tubular construction. The wings have Duralumin spars with stainless steel fittings, and are fabric covered. The pilots' cabin is in the extreme nose of the fuselage, whence the view is quite exceptionally good. The cabin is divided into two compartments, and has seating accommodation for 38 or 18 passengers, according to whether the machine is of the "Western" or "Eastern" type. The former is used in Europe, the latter between Egypt and Karachi.

All who have travelled in the H.P. 42 class of aeroplane are unanimous that the comfort, and particularly the absence of noise, is far greater than has been achieved before in a similar type of machine. The two cabins are so arranged, with a space between them, that no passenger is in line with the propellers. This has helped materially in reducing noise, as has also, of course, the actual dimensions of the machine, which remove the engines a considerable distance from the cabins.

The power plant of the H.P. 42 consists of four Bristol Jupiters, of which two are placed close together in the centre of the top plane, while the other two are placed fairly far outboard on the lower wing.

Some idea of the size of the H.P. 42 can be formed from the following data:—

Length o.a.	..	89 ft. 9 in. (27.36 m.)
Wing span (upper)		130 ft. (39.62 m.)
Wing area	..	3,000 sq. ft. (279 m ² .)
Gross weight ("Western")		29,500 lb. (13 400 kg.)
Pay load ("Western")		8,500 lb. (3 860 kg.)
Gross weight ("Eastern")		28,000 lb. (12 800 kg.)
Pay load ("Eastern")		7,000 lb. (3 180 kg.)
Max speed ("Western")		127 m.p.h. (205 km./h.)
Cruising speed ("Western")		100 m.p.h. (161 km./h.)
Max. speed ("Eastern")		120 m.p.h. (194 km./h.)
Cruising speed ("Eastern")		100 m.p.h. (161 km./h.)

The "Western" type has Jupiter X.F. BM engines and the "Eastern" Jupiter XI F.

H.P. 38 (p. 1079)

The latest Handley Page night bomber is the H.P. 38 "Heyford," which is of unusual design in that the fuselage and engines (Rolls-Royce Kestrels) are placed immediately under the top plane. A very good view and field of fire is thereby ensured for the crew. There are three gun positions: one in the extreme nose, one in a retractable and rotating turret under the fuselage, and one immediately above the turret.

Following are the only data which it is permissible to publish:—

Length o.a.	.. ..	58 ft. (17.68 m.)
Span	.. ..	75 ft. (22.86 m.)
Wing area	.. ..	1,470 sq. ft. (136.5 m ² .)
Gross weight	.. ..	15,500 lb. (7 037 kg.)

H.P. Slots

The popularity of Handley Page automatic wing-tip slots is growing rapidly. In the International Touring Competition automatic lift slots were used with excellent results, enabling several aircraft to achieve speed ranges of the order of 4:1. The development of the slots may now be said to have outstripped that of the aircraft using them, and the next step must be a better undercarriage or the adoption of variable angle of incidence to enable aircraft to use the high lift given at large angles.

The H. G. Hawker Engineering Co., Ltd.

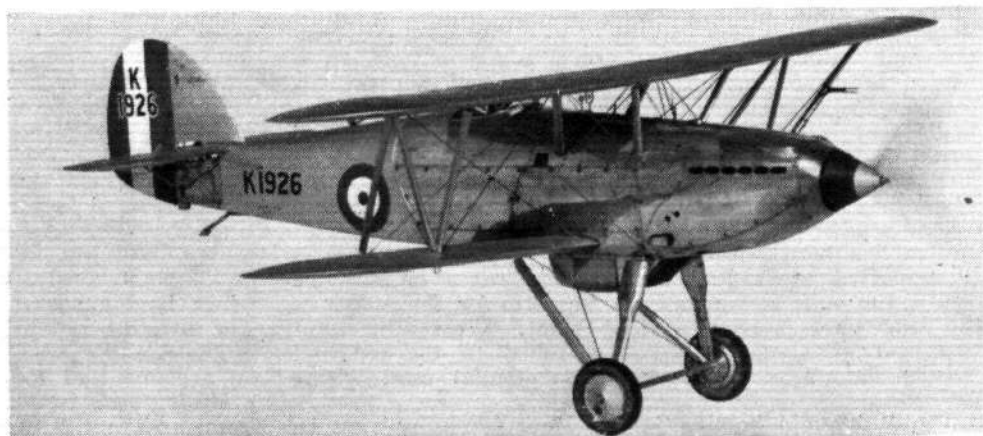
Kingston-on-Thames

DURING the war period the name Sopwith became a household word. Sopwith machines in enormous numbers, and covering a great variety of types, were in use in many theatres of war. After the war the old Sopwith firm ceased to exist, and out of it grew the present H. G. Hawker Engineering Co., Ltd., which, under the joint managing directorship of Mr. T. O. M. Sopwith and F. Sigrist, has worthily upheld the splendid traditions of the old Sopwith Company.

During the last two or three years Hawker machines have been adopted very extensively by the British Royal Air Force, while not inconsiderable numbers have been sold abroad. The present greatness of the firm may be said to have started with the "Fury," a single-seater interceptor fighter, which in turn was made possible by the introduction of the Rolls-Royce Kestrel engine. The combination was one which resulted in a quite exceptional performance.

The interceptor fighter is, as its name implies, intended to intercept and fight approaching enemy aircraft, and for this purpose the greatest possible rate of climb is required in order to get to the raider's altitude in the shortest possible time. When that altitude has been reached, the interceptor fighter must have sufficient speed and manoeuvrability to be able to tackle the raider effectively. These qualities of climb and speed at height are achieved to a remarkable degree in the "Fury."

The next type to be produced by the Hawker firm was



THE HAWKER "FURY": A single-seater interceptor fighter with Rolls-Royce Kestrel engine. (FLIGHT Photo.)

the two-seater "Hart," a high-performance day bomber, also fitted with the Rolls-Royce Kestrel engine. The same clean design as characterised the "Fury" was found in the "Hart," and it was not long before that also was adopted in considerable numbers, and for various purposes.

As there appears to exist a good deal of confusion concerning the various Hawker types, it may be of assistance if we outline briefly the purposes for which the various types are used.

Beginning with the "Fury," this was, as already mentioned, the first modern Hawker aircraft, and in its standard form is the interceptor fighter. For use as a fleet fighter, operating from aircraft carriers, a slightly modified version known as the "Nimrod" is now produced, and various carriers are now in process of being re-equipped with this machine.

In the two-seater class we may begin with the "Hart," which in what may be termed its standard form is a day bomber. As a two-seater fighter the "Hart" is known as the "Demon," and when the "Hart" is equipped for Army co-operation it is known as the "Audax."

The "Osprey," although generally similar to the "Hart," is regarded as a distinct type, and is a fleet fighter reconnaissance machine, and can thus be regarded as the "opposite number" in the two-seater class of the "Nimrod."

George Parnall & Co.

Yate Aerodrome, Gloucestershire

A LARGE number of experimental aircraft types have been built by George Parnall & Co. during the last ten years or so. Some of these have been built to the order of the Air Ministry, while others have been civil types, mostly of small size and low power.

The Parnall "Elf" (page 1071) is a two-seater light biplane fitted with Cirrus-Hermes engine, and is chiefly remarkable for its unorthodox wing bracing, which is in the form of struts arranged in a Warren girder, and has the advantage of requiring no rigging after the machine leaves the shops. The "Elf" has an overall length of 22 ft. 10 in. (6.97 m.), a wing span of 31 ft. 3 in. (9.53 m.), and a wing area of 195 sq. ft. (18.1 m²). The tare weight is 900 lb. (409 kg.) and the loaded weight 1,500 lb. (682 kg.). The maximum speed is 116 m.p.h. (187 km./h.) and the cruising speed 103 m.p.h. (166 km./h.). The range at cruising speed is 400 miles (645 km.).

E. W. Percival

20, Grosvenor Place, London, S.W.1

A WELL-KNOWN firm is now building for Mr. E. W. Percival the very fast little "Gull" three-seater cabin monoplane, the first specimen of which put up such a splendid performance in the race for the King's Cup last summer, when the machine averaged 142.75 m.p.h. (230 km./h.) over the whole course.

The Percival "Gull" is a low-wing monoplane, mainly of wood construction, with a tapered cantilever wing faired into the fuselage, and a very simple type of undercarriage attached direct to the wing. That the design is very clean aerodynamically is proved by the high performance, which is unusually good in view of the fact that the machine is a

three-seater and the engine a Hermes IV of 130 b.h.p. only.

The main data of the Percival "Gull" are:—

Length o.a.	24 ft. 8 in. (7.52 m.)
Wing span	36 ft. 0 in. (10.8 m.)
Wing area	169 sq. ft. (15.7 m ² .)
Tare weight	1,170 lb. (532 kg.)
Gross weight	2,050 lb. (932 kg.)
Maximum speed	145 m.p.h. (233 km./h.)
Cruising speed	125 m.p.h. (201 km./h.)
Range	700 miles (1 125 km.)

Redwing Aircraft Co., Ltd.

Gatwick Aerodrome, Surrey

DESIGNED to be really easy to fly, the "Redwing" side-by-side two-seater was designed by Mr. John Kenworthy to incorporate such features as low landing speed, good controllability to enable the slow landing to be made in safety, good stability at all speeds so that the machine should not be fatiguing to fly, and with a wide undercarriage track to ensure stability on the ground and to avoid risk of blowing over in a strong wind.

The "Redwing" has been in use by various schools and clubs for a considerable period, and the aims of its designer appear to have been fulfilled. Mr. Kenworthy believes that the side-by-side seating arrangement is the logical one, not only for school work, where the pilot and instructor can converse without the use of telephones, but also for private use, as the side-by-side seating is more sociable (p. 1079).

The engine fitted as standard in the "Redwing" is the Armstrong-Siddeley Genet, of 80/88 b.h.p. With this engine the petrol consumption is approximately 5 gall. (22.7 litres) per hr., so that at cruising speed the "Redwing" does approximately 20 miles per gall. (56.5 km./litre) of petrol. The petrol tank has a capacity sufficient for 3½ hr. at a cruising speed of 85 m.p.h. (137 km./h.), giving a range of about 275 miles (440 km.). The maximum speed of the "Redwing" is 96 m.p.h. (155 km./h.), and the landing speed reaches the very low figure of 30 m.p.h. (48 km./h.).

The "Redwing" has a length of 22 ft. 3 in. (6.8 m.) and a wing span of 30 ft. 6 in. (9.3 m.). The wing area is 250 sq. ft. (23.2 m²).

For a tare weight of 870 lb. (395 kg.) the "Redwing" has a disposable load of 580 lb. (263 kg.), giving a gross weight of 1,450 lb. (660 kg.).

A. V. Roe & Co., Ltd.

Newton Heath, Manchester

THE name A. V. Roe goes back to the earliest days of aviation in Great Britain, and Sir Alliott V. Roe was a pioneer of British design and construction. It is worth recalling that at the beginning of flying, when almost all the rest of the world's experimenters were developing the "pusher" type of aircraft, Mr. A. V. Roe (as he then was) foresaw the advantages of the tractor type of aeroplane, the type which was destined later to become almost universal. Sir Alliott V. Roe is no longer associated with the firm which bears his name, the company having now been included in the group of firms presided over by Sir John D. Siddeley.

Almost from its earliest days the Avro firm has specialised in training types of aircraft. Considerable numbers of other types have been produced from time to time, but it is the training type which has brought the Avro firm world renown, and there was thus poetic justice as well as good common sense in the decision made by the British Air Ministry recently, when the question of replacing the good old Avro 504 arose, to award the order to A. V. Roe & Co., Ltd., and to standardise the Avro 621 as the training machine of the British Royal Air Force. The 621 is known also as the "Tutor" (p. 1078).



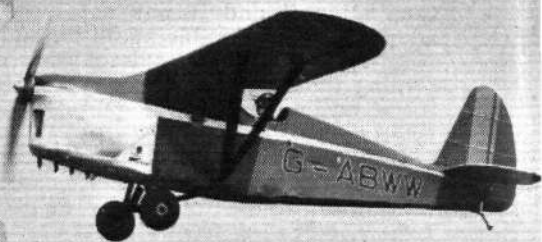
THE PERCIVAL "GULL": A private owner's three-seater with Cirrus-Hermes IV engine. (FLIGHT Photo.)

SOME REPRESENTATIVE

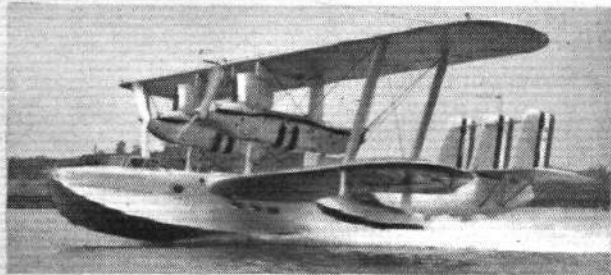
HAWKER "HART"



COMPER "SWIFT" (*Gipsy III*)



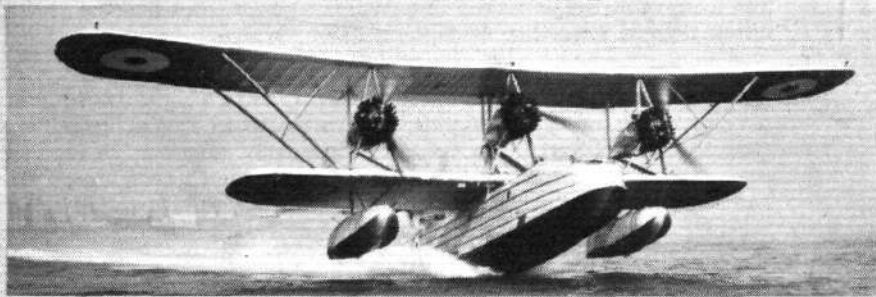
ARMSTRONG WHITWORTH (*Type A.W. XVI*)



SHORT "SINGAPORE II"



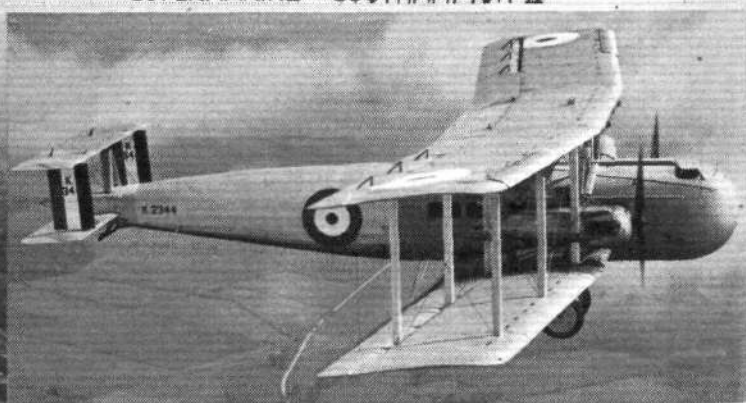
AVRO "TUTOR"



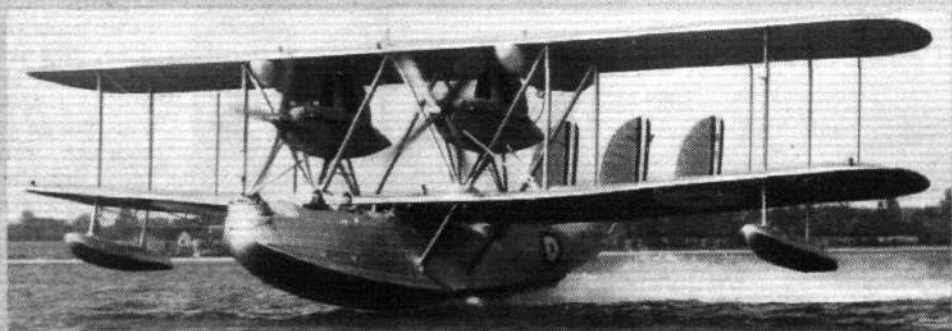
SUPERMARINE "SOUTHAMPTON X"



A.W. 15
"ATALANTA"



VICKERS
"VICTORIA"



SUPERMARINE "SOUTHAMPTON (*Stream Cooled*)"

BRITISH AIRCRAFT

HANDLEY PAGE "HEYFORD"



"REDWING II"



AIRSPEED "FERRY"



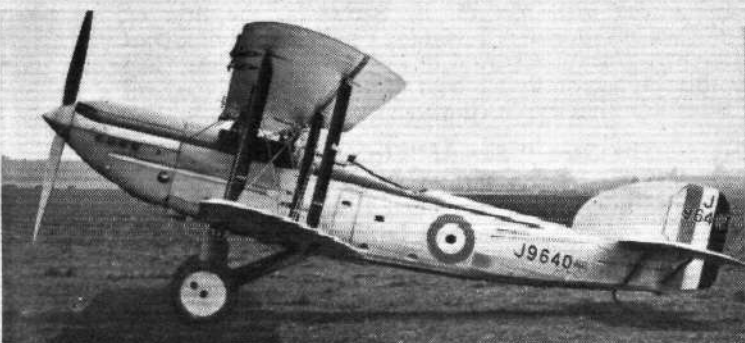
COMPER "SWIFT" (Pobjoy)



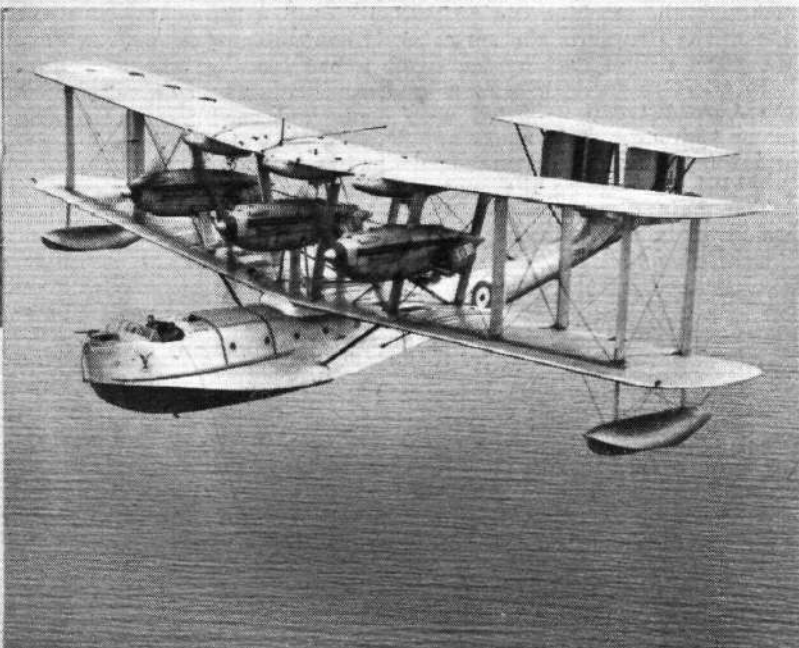
DE HAVILLAND "MOTH" (Gipsy III)



DE HAVILLAND "FOX MOTH"



FAIREY III F. (G.P.)



BLACKBURN
"IRIS V"



SPARTAN
3 SEATER



HANDLEY PAGE (Type 42)



THE AVRO 626: A training type used for flying training and military training (gunnery, bombing, photography, radio, etc.).

The Avro 621 (p. 1078)

The 621 is an equal-span, single-bay biplane of all-metal construction, but with fabric covering. The fuselage is a welded steel tube structure, while the wings have strip-steel spars and pressed light metal ribs. Bristol-Frise ailerons are fitted. The power plant of the 621 is an Armstrong-Siddeley Lynx developing 215 b.h.p. at 1,900 r.p.m. By giving the wings a pronounced stagger, not only do both occupants obtain a good view, but both are able to use their parachutes in emergency.

Both cockpits are identical in size and arrangement and, of course, full dual controls are provided, so that the machine can be flown equally well from either cockpit.

A wide-track undercarriage is used, and the shock-absorbing qualities have been so proportioned that, although the machine can be landed heavily without damage to the structure, the springing is hard enough to make the pupil realise that he has made a bad landing.

In addition to its uses as a landplane training machine, the Avro 621 can be fitted with floats and used for sea-plane training. The floats are fitted with water rudders and the airscrew is of metal, while hand-turning gear is provided for starting the engine.

The main dimensions, weights and performance figures are given in the following data:—

Length o.a.	26 ft. 4½ in. (8 m.)
Wing span	34 ft. 0 in. (10.36 m.)
Wing area	300 sq. ft. (27.9 m².)
Tare weight	1,800 lb. (818 kg.)
Normal load	649 lb. (295 kg.)
Normal gross weight	2,449 lb. (1 113 kg.)
Max. permissible gross weight (aerobatic)	2,500 lb. (1 135 kg.)
Maximum speed	115 m.p.h. (185 km./h.)
Cruising speed	95 m.p.h. (153 m.p.h.)
Initial rate of climb	880 ft./min. (4.5 m./sec.)
Service ceiling	15,000 ft. (4 570 m.)

The Avro 626

Similar in general appearance to the "Tutor" 621, the Avro 626 has been designed for complete instruction of military flying personnel, from flying instruction (*ab initio* to advanced aerobatics) through night flying to instruction in gunnery, bombing, photography, radio, etc. How wide is its scope may be gathered from the fact that the Avro 626 can be equipped for no less than 11 alternative training duties, and in all 11 cases the machine carries instructor as well as pupil. All the armament and equipment used for specialised instruction is of standard service pattern as used in military aircraft. It will doubtless be of interest to enumerate in a little more detail the training purposes for which this versatile aircraft can be used. (Obviously the equipment for any one or, at most two duties only is carried at the same time.) Dual-control flying instruction; blind flying and night flying; offensive gunnery, using Vickers gun; offensive gunnery using camera gun; defensive gunnery using Vickers or Lewis gun; defensive gunnery using camera gun; bombing for observer (prone position); bombing for pilot; wireless telegraphy and telephony; photography and navigation,

Although it is not intended that the one individual aircraft should be used for all these duties, but rather assumed that the user will have a series of machines, each equipped for a particular duty, it is nevertheless possible to change one complete set of equipment for another in a very short time—something like 2-3 hours.

To facilitate inspection and interchange of equipment, the sides of the fuselage, from the engine to a point aft of the gun turret, are covered with a series of quickly removable panels, so that in a moment the whole internal structure, equipment, controls, etc., can be exposed and made readily accessible.

Structurally the 626 is similar to the 621, and the engine is also the same, i.e., the Armstrong-Siddeley Lynx. The dimensions of the 626 are almost identical with those of the 621.

The tare and gross weights of the 626 vary, of course, in accordance with the particular duties for which the machine happens to be equipped. The tare weight varies from about

1,930 lb. (877 kg.) to about 2,000 lb. (910 kg.). The gross weight also varies according to the particular duties, but in no instance does it reach the permissible figure of 2,750 lb. (1 227 kg.) for aerobatics category or 3,000 lb. (1 363 kg.) for normal category.

The performance figures for the Avro 626 are substantially the same as for the "Tutor" 621.

Saunders-Roe, Limited

Cowes, Isle of Wight

FROM the time Sir Alliott V. Roe and Mr. John Lord joined forces with Mr. H. E. Saunders, the firm of Saunders-Roe has pursued a vigorous policy of flying-boat development. During a period of a few years no less than four distinct types of flying boat have been produced, of which three are civil types, the fourth a military machine.

The Saro "Severn" (p. 1071)

The Saro "Severn" is a three-engined long-range open sea reconnaissance flying boat fitted with three Bristol Jupiter XI.F. engines. The hull is of all-metal construction, as are also the wings, with the exception of the covering. The machine is intended to carry a crew of five, including pilot, second pilot-navigator, engineer, wireless operator, and gunner. The machine has a length of 61 ft. (18.6 m.) and a wing span of 88 ft. (26.8 m.). The total wing area is 1,500 sq. ft. (140 m²). No weight or performance data are available.

"Cutty Sark," "Windhover" and "Cloud"

The family of civil flying boats includes the above three, the "Cutty Sark" being the smallest and the "Cloud" the largest. In the structural methods adopted the three machines are similar, with "Alclad"-covered metal hull and plywood-covered wooden wing.

The "Cutty Sark" is a small four-seater amphibian flying boat, with two Armstrong-Siddeley Genet Major engines (Gipsy II, Gipsy III and Hermes IV are optional alternatives). The engines are placed on struts above the wing, where they are very accessible, and where the propellers are well clear of water spray.

As a plain flying boat, with the Genet Major engines, the "Cutty Sark" has the following characteristics:

Length o.a.	34 ft. 4 in. (10.45 m.)
Wing span	45 ft. (13.7 m.)
Wing area	320 sq. ft. (29.7 m².)
Tare weight	2,555 lb. (1 160 kg.)
Pay load	850 lb. (386 kg.)
Gross weight	3,997 lb. (1 817 kg.)

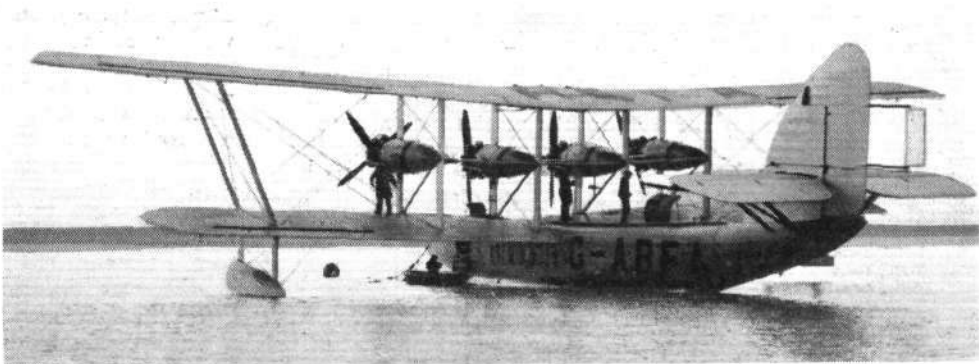
Next in size comes the Saro "Windhover" (p. 1071). This is a six-seater flying boat fitted with three de Havilland Gipsy II engines of 120 h.p. each. The data of the "Windhover" are:

Length o.a.	41 ft. 4 in. (12.6 m.)
Wing span	54 ft. 4 in. (16.55 m.)
Wing area	450 sq. ft. (41.8 m².)
Tare weight	3,650 lb. (1 660 kg.)

Pay load ..	1,030 lb. (468 kg.)
Gross weight ..	5,600 lb. (2 545 kg.)
Maximum speed	110 m.p.h. (177 km./h.)
Cruising speed	90 m.p.h. (145 km./h.)
Range ..	360 miles (500 km.)

The Saro "Cloud" (p. 1071) is an eight-seater amphibian flying-boat fitted with two Armstrong-Siddeley Double Mongoose engines of 340 h.p. each. The main data are:

Length o.a. ..	49 ft. 9 in. (15.15 m.)
Wing span ..	64 ft. (19.5 m.)
Wing area ..	650 sq. ft. (60.4 m².)
Tare weight ..	5,800 lb. (2 640 kg.)
Pay load ..	2,580 lb. (1 173 kg.)
Gross weight ..	9,700 lb. (4 400 kg.)
Maximum speed	128 m.p.h. (206 km./h.)
Cruising speed	102 m.p.h. (164 km./h.)
Range ..	400 miles (645 km.)



THE SHORT "SCIPIO": A four-engined commercial flying-boat (Bristol Jupiter X.F. BM.) used by Imperial Airways in the Mediterranean. (FLIGHT Photo.)

Short Brothers, Ltd.
Rochester, Kent

LONG before aeroplanes came into being Short Brothers were aeronautical engineers in that in 1897 they had established their own balloon factory. When the work of Wright Brothers and other experimenters began to become known Short Brothers were quick to realise the tremendous possibilities of heavier-than-air craft, and at once set to work to design and construct. Since those early days (1909 or so) they have never looked back, and to-day Short Brothers are among the most esteemed of British aircraft firms. Twin-float seaplanes were among the first Short machines to be constructed, and ever since then the firm has been closely connected with the development of marine aircraft. Of recent years these have been mostly of the flying-boat type, although other types have also been produced.

The first commercial flying-boat to make the name of Short famous was the "Calcutta" (page 1070), which was designed and built for work on the Mediterranean section of the Imperial Airways route to Egypt and Cape Town. The "Calcutta" (three Bristol Jupiter XI.F engines) is a 16-passenger all-metal flying-boat, with a hull built of Duralumin and biplane wings having Duralumin spars and ribs, with fabric covering. The crew consists of three, with dual controls in the cockpit.

The principal "Calcutta" data are:—

Length o.a. ..	66 ft. 0 in. (20.1 m.)
Wing span ..	93 ft. 0 in. (28.3 m.)
Wing area ..	1,825 sq. ft. (170 m².)
Tare weight ..	13,845 lb. (6 300 kg.)
Fuel ..	4,050 lb. (1 840 kg.)
Pay load and crew	4,605 lb. (2 090 kg.)
Maximum weight ..	22,500 lb. (10 230 kg.)
Maximum speed ..	118 m.p.h. (190 km./h.)
Cruising speed ..	97 m.p.h. (156 km./h.)
Range ..	650 miles (1 046 km.)

The "Scipio" Class

Originally known as the "Kent" class, this flying-boat is a four-engined commercial craft with Bristol Jupiter XF. BM engines, and has now taken the place of the "Calcuttas" on the Mediterranean section, the "Calcuttas" having been transferred to the Nile section of the route. In addition to 15 passengers the "Scipio" class carries nearly two tons of mail or freight, and the passenger accommodation is generally admitted to be the most comfortable ever provided. In particular has noise been reduced to a minimum.

A good idea of the magnitude of the Short "Scipio" class can be formed from the following data:—

Length o.a. ..	78 ft. 5 in. (23.9 m.)
Wing span ..	113 ft. 0 in. (34.5 m.)
Wing area ..	2,640 sq. ft. (245 m².)
Tare weight ..	20,460 lb. (9 300 kg.)
Fuel ..	3,420 lb. (1 555 kg.)
Pay load and crew	8,120 lb. (3 690 kg.)
Maximum weight ..	32,000 lb. (14 545 kg.)
Range ..	450 miles (725 km.)
Ceiling ..	20,000 ft. (6 100 m.)

The "Valetta"

Originally designed as a twin-float seaplane, the "Valetta" (three Bristol Jupiter XI.F) monoplane (page 1071) has also been fitted with wheels and flown as a landplane. The fuselage is of a construction similar to that used in the Short boat hulls, and the wing has Duralumin spars and ribs. The cabin has accommodation for 16 passengers.

The principal data of the "Valetta" are:—

Length o.a. ..	69 ft. 8 in. (21.2 m.)
Wing span ..	107 ft. 0 in. (32.6 m.)
Wing area ..	1,382 sq. ft. (128 m².)
Tare weight ..	16,070 lb. (7 320 kg.)
Fuel ..	2,960 lb. (1 345 kg.)
Pay load and crew	3,970 lb. (1 805 kg.)
Maximum weight ..	23,000 lb. (10 470 kg.)
Range ..	550 miles (885 km.)
Ceiling ..	17,000 ft. (5 180 m.)

Military Types

Several military types of Short flying-boats have been built, such as the "Rangoon" (military version of the "Calcutta"), the "Singapore I," the "Singapore II" and the R.6/28. Space permits of referring to the latter only.

The Short R.6/28 (page 1070) is generally similar to other Short flying-boats, but is fitted with six Rolls-Royce Buzzard engines arranged in three tandem pairs. Stainless steel is used extensively in the construction of the hull. The machine is far and away the largest flying-boat ever produced by a British aircraft firm, as will be realised when we state that the maximum authorised weight is no less than 70,000 lb. (31 750 kg.), while the wing span is 120 ft. (36.6 m.) and the overall length 89 ft. 6 in. (27.3 m.). Performance data may not be published, but the Short R.6/28 is probably one of the fastest flying-boats in the world.

Spartan Aircraft, Limited
Cowes, Isle of Wight

ASSOCIATED with Saunders-Roe, Ltd., in that Sir Alliot V. Roe and Mr. John Lord are directors of both firms, Spartan Aircraft, Ltd., has developed from the firm originally started by Mr. O. E. Simonds, M.P. (who is now no longer connected with it), and several interesting types of aircraft for the private owner have been produced. Of these we have space to refer to but two.

The Three-Seater Mark II

This is the latest development (p. 1079) of the earlier three-seater built by this firm, and the accommodation is so arranged that the pilot occupies the front seat, with the passengers behind him. In this way not only does the pilot obtain a splendid view forward over the inverted Hermes II engine (Gipsy III and Hermes IV as alternative), but the passengers are in a better position for getting in and out. The machine is of simple straightforward construction, and is an equal-span biplane. When fitted with the Hermes IV engine the data are:

Length o.a. ..	26 ft. 3 in. (7.9 m.)
Wing span ..	28 ft. 10 in. (8.8 m.)
Wing area ..	240 sq. ft. (22.3 m².)
Tare weight ..	1,150 lb. (522 kg.)
Fuel ..	170 lb. (77 kg.)
Oil ..	20 lb. (9 kg.)
Useful load ..	340 lb. (154 kg.)
Gross weight ..	1,680 lb. (762 kg.)
Maximum speed ..	107 m.p.h. (172 km./h.)
Cruising speed ..	95 m.p.h. (153 km./h.)
Landing speed ..	44 m.p.h. (71 km./h.)
Rate of climb ..	750 ft./min. (3.8 m./sec.)
Range ..	260 miles (418 km.)

These figures refer to the machine when loaded to the "Aerobatic" weight. For "Normal" category the gross weight becomes 1,850 lb. (839 kg.) and the useful load 510 lb. (231 kg.). The performance is not greatly inferior to that of the 1,680 lb. machine.

The Spartan "Cruiser"

This three-engined six-seater is a low-wing cantilever monoplane fitted with three de Havilland Gipsy III engines (p. 1070). It has an extremely comfortable cabin, and safety is ensured by the ability of the machine to fly on any two of its three engines. Structurally the "Cruiser" resembles the Saro flying boats in that it has an "Alclad"-covered fuselage and wooden wings. The data of the Spartan "Cruiser" are:

Length o.a.	39 ft. 2 in. (11.95 m.)
Wing span	54 ft. 0 in. (16.45 m.)
Wing area	436 sq. ft. (40.5 m ² .)
Tare weight	3,400 lb. (1 542 kg.)
Pilot	170 lb. (77 kg.)
Five passengers	800 lb. (363 kg.)
Fuel and oil	1,000 lb. (454 kg.)
Gross weight	5,500 lb. (2 495 kg.)
Maximum speed	135 m.p.h. (217 km./h.)
Cruising speed	110 m.p.h. (177 km./h.)
Initial rate of climb	600 ft./min. (3.06 m./sec.)
Ceiling	15,000 ft. (4 570 m.)
Range	660 miles (1 062 km.)

The machine can also be used as a freighter, when the pay load becomes 1,010 lb. (458 kg.), the range remaining the same as before.

The Supermarine Aviation Works, Ltd.
Woolston, Southampton

FOUNDED in 1913 by Mr. Noel Pemberton Billing, the Supermarine works are now a part of the Vickers (Aviation) group, but its traditions as seaplane designers and constructors are being maintained, and marine aircraft form the bulk of the firm's productions. Flying-boats have always been Supermarine's speciality, but it must not be overlooked that the firm has shown its ability to produce fast racing craft as well by designing and building no less than four Schneider Trophy winners! That, surely, is a unique record. The last of the Schneider winners, the S.6B with Rolls-Royce "R" engine, in addition to winning that classic race, also established, piloted by Flt. Lt. Stainforth, a world's speed record of 655 km./h. (407 m.p.h.).

The Supermarine "Southampton" flying-boats have seen long and useful service, not only in British home waters, but also abroad. The latest version, the "Southampton" Mark II (page 1078), is fitted with two Rolls-Royce Kestrel engines, and evaporative cooling is employed, so that this machine is in every way up to date.

Principal particulars of the "Southampton" Mark II are:—

Tare weight	9,014 lb. (4 088 kg.)
Crew (5)	1,000 lb. (454 kg.)
Fuel	3,496 lb. (1 586 kg.)
Oil	213 lb. (97 kg.)
Military load	1,127 lb. (511 kg.)
Gross weight	14,850 lb. (6 735 kg.)
Maximum speed	117.5 m.p.h. (189 km./h.)
Cruising speed	90 m.p.h. (145 km./h.)
Alighting speed	54 m.p.h. (87 km./h.)
Service ceiling	13,300 ft. (4 053 m.)
Duration	10½ hours
Range	945 miles (1 521 km.)

The Supermarine Aviation Works are at present constructing an attractive private venture marine aircraft which will be available in both service and civil form. At present the firm prefers not to disclose any particulars.

Vickers (Aviation) Limited
Weybridge, Surrey

ALTHOUGH the machines for which Vickers (Aviation), Ltd., are generally known throughout the world are probably mostly their heavy long-distance night bombers, of which the firm has supplied large numbers to the R.A.F., the firm has produced a great many other types, several of which have gained fame abroad. Of the many types produced we have space here to deal with but a very few. It might be recalled, however, that a Vickers "Vespa" (Bristol Pegasus engine) holds the world's altitude record (pilot, C. F. Uwins, of the Bristol Company) of 13,404 m. (43,976 ft.).

The "Vildebeest"

Fitted for a range of duties such as reconnaissance, general purposes, bombing and torpedo carrying, the scope of the "Vildebeest" (page 1070) does not end

there, but includes also the fitting of floats, when a variety of seaplane functions can be performed by the machine. As a torpedoplane the "Vildebeest" has now been adopted as the standard machine of the R.A.F., and squadrons are in process of being re-equipped with it. As used in the R.A.F. the machine will be powered by the Bristol Pegasus engine.

Another version of the "Vildebeest" is fitted with the Hispano-Suiza 12-Lbr engine of 600 h.p. The armament consists of two Vickers machine guns, one synchronised to fire through the propeller and the other on a Scarff ring in the rear cockpit, and of either a torpedo weighing 2,200 lb. (1 000 kg.) or the equivalent load of bombs.

The main data of the "Vildebeest" are:—

Length o.a.	38 ft. 6 in. (11.75 m.)
Wing span	49 ft. 0 in. (14.94 m.)
Wing area	728 sq. ft. (67.75 m ² .)
Tare weight	4,459 lb. (2 020 kg.)
Fuel and military load	3,500 lb. (1 590 kg.)
Gross weight	8,346 lb. (3 786 kg.)
Max. permissible weight	8,500 lb. (3 854 kg.)
Maximum speed	136 m.p.h. (220 km./h.)
Speed at 3 000 m.	120 m.p.h. (193 km./h.)
Range	746 miles (1 200 km.)
Absolute ceiling	14,250 ft. (4 350 m.)

When the machine is fitted with the Pegasus engine the performance is slightly increased, with the exception of the range, which is slightly decreased.

The "Jockey"

Known as the "Jockey," this diminutive Vickers machine (page 1071) is a single-seater interceptor fighter of all-metal construction, including the covering of wings and fuselage (Duralumin). The machine is a low-wing monoplane, and the armament consists of two synchronised Vickers guns with 1,200 rounds of ammunition. The engine is a Bristol Jupiter VII F (or any equivalent engine), and with this power the machine has the following characteristics:—

Length o.a.	23 ft. 0 in. (7 01 m.)
Wing span	32 ft. 8 in. (9.9 m.)
Wing area	150 sq. ft. (14 m ² .)
Tare weight	2,268 lb. (1 029 kg.)
Pilot	180 lb. (82 kg.)
Petrol	392 lb. (178 kg.)
Oil	50 lb. (23 kg.)
Service equipment	271 lb. (123 kg.)

The highest speed is attained at 3 000 m. (9,840 ft.), and is 218 m.p.h. (352 km./h.). The initial rate of climb is 1,850 ft./min. (9.4 m./sec.), and the absolute ceiling 31,500 ft. (9 600 m.)

The "Victoria"

The "Victoria" (page 1078) is in extensive use by the British Royal Air Force as a troop carrier, with cabin space for 22 troops. The engines (two) are Napier Lion XI, with which the machine has the following characteristics:—

Length o.a.	59 ft. 6 in. (18.1 m.)
Wing span	87 ft. 4 in. (26.6 m.)
Wing area	2,178 sq. ft. (202 m ² .)
Tare weight	10,030 lb. (4 549 kg.)
Gross weight	17,760 lb. (8 040 kg.)
Maximum speed	110 m.p.h. (177 km./h.)
Range	770 miles (1 240 km.)
Absolute ceiling	16,200 ft. (4 940 m.)

When the Bristol Pegasus is fitted, the disposable load is increased, and the speed goes up to 130 m.p.h. (209 km./h.), while other performance figures are similarly improved.

Westland Aircraft Works
Yeovil, Somerset

FOR many years the Westland Aircraft Works, which are a branch of the very old firm of Petters, Ltd., have concentrated largely on general-purpose aircraft, and the "Wapiti," which is so far the most famous of these, has been supplied to the British Royal Air Force, the Royal Australian Air Force, and the South African Air Force in numbers exceeding 500. However, all good things must come to an end, and even the "Wapiti" could not last for ever. Realising this, the Westland designers set to work to produce a successor, in which should be incorporated all such improvements as the vast experience accumulated with the "Wapiti" at home, in Iraq and in India had suggested. The result has been that before the "Wapiti" has become obsolete the Westland Aircraft Works already have the "next step" in production, largely due to the foresight of the firm's managing director, Mr. Bruce.

The "Wallace"

Originally produced as a "Private Venture," and known as the P.V.6, the "Wallace" is, like the "Wapiti," a

type which lends itself to use in a great variety of military operations, and is thus truly a general-purpose machine. Its adoption makes for national economy, since the machine can undertake a wide range of duties which would otherwise have to be catered for by numbers of specialised types. Designed primarily for the Bristol "Pegasus" engines, the "Wallace" can be fitted with any other radial engine of comparable power and weight. The machine is, of course, of all-metal construction, with square tube fuselage and steel structure biplane wings of equal span and chord, and with two-bay bracing arrangement.

Aerodynamic efficiency is increased by fitting a Townend ring over the engine, and "spats" over the wheels. Performance figures may not be published, but the "Wallace" is a considerable improvement on the "Wapiti" in speed and climb, while still carrying the great military loads demanded of general-purpose aircraft.

To add to its versatility, a twin-float undercarriage has been designed for the "Wallace," the float undercarriage being interchangeable with the wheel undercarriage. And finally the machine can be fitted with a ski undercarriage, so that it can be operated from snow-covered ground, frozen lakes, etc.

Few data relating to the "Wallace" may be published, but it may be said that for "normal" certificate of airworthiness the gross weight may be as high as 6,300 lb. (2 860 kg.), while for "aerobatic" certificate of airworthiness the maximum permissible weight is 5,650 lb. (2 565 kg.). By fitting extra petrol tanks under the lower wings the range of the "Wallace" can be increased to 1,000 miles (1 610 km.).

The "Wessex"

The Westland "Wessex" is a small three-engined six-seater commercial monoplane fitted with three Armstrong-Siddeley seven-cylinder Genet Major engines of 140 b.h.p. each. The machine is intended for lines where the volume of traffic is not sufficient to justify the operation of larger

machines, but where the safety and regularity of the three-engined arrangement of the power plant is desired. The machine has been in use by the Belgian Sabena Company for a considerable period, and has given very good results. By removing the cabin equipment the "Wessex" can be used as a freight carrier, when it has a very good pay load.

The fuselage is composed of three units, of which the front portion is of mixed construction, the cabin portion of wood, and the rear portion of square section duralumin tube. The wing is of wooden construction, and is strut braced to the engine supports. Wheel brakes and a castoring tail wheel are fitted, so that the machine can be turned in a very small circle on the ground.

The cabin lay-out depends upon the user's requirements. If it is desired to have ample luggage and lavatory accommodation, then the cabin has seats for four passengers, while a fifth may, if no spare pilot is carried, occupy the seat in the cockpit. If, on the other hand, large luggage space and a lavatory are not essential, the cabin can be furnished to accommodate five or six passengers.

When the "Wessex" is fitted with the seven-cylinder Genet Major engines it will, when carrying full load, maintain height at 6,000 ft. (1 830 m.) with any one of the three engines out of commission.

The principal data relating to the "Wessex" as a passenger machine are:

Length o.a.	38 ft. 0 in. (11.55 m.)
Wing span	57 ft. 6 in. (17.5 m.)
Wing area	490 sq. ft. (45.5 m ² .)
Tare weight	3,930 lb. (1 785 kg.)
Fuel and oil	845 lb. (383 kg.)
Pilot	170 lb. (77 kg.)
Pay load	1,055 lb. (478 kg.)
Total loaded weight	6,000 lb. (2 723 kg.)
Maximum speed	118 m.p.h. (190 km. h.)
Cruising speed	100 m.p.h. (161 km. h.)
Initial rate of climb	680 ft. min. (3.5 m. sec.)
Time to 5,000 ft. (1 525 m.)	9.1 min.
Time to 10,000 ft. (3 050 m.)	25 min.
Service ceiling	12,700 ft. (3 880 m.)
Absolute ceiling	14,900 ft. (4 550 m.)
Fuel consumption (cruising)	24.75 gals. hr. (112 litres hr.)
As a goods machine the pay load becomes 1,156 lb. (524 kg.)	



LANDING EXTRAORDINARY : The latest type of experimental Autogiro has no fixed wing, no ailerons, and no elevator. Control is by tilting the rotor direct. The machine can be landed with its tail wheel touching first, the rest of the aircraft then sinking quite slowly to earth. When this picture was taken Mr. de la Cierva was landing the machine in this fashion. (FLIGHT Photo.)

AIR DISARMAMENT

Mr. Baldwin's Speech

IN the course of a debate on Disarmament in the House of Commons on Thursday, November 10, which followed on a motion by Mr. Attlee, Mr. Baldwin made a very striking speech. He opened by saying that he found himself in profound agreement with one or two observations by Mr. Lansbury. Disarmament, in his view, would not stop war; it was a matter of the will to peace.

It was the highest duty of statesmanship to work to remove the causes of war. What you could hope to do by disarmament was to make war more difficult, more difficult to start, and to pay less to continue, and to that he thought they ought to devote their minds.

"What the world suffers from is a sense of fear," he said, "and a want of confidence. It is a fear held instinctively. But in my view, and I have slowly and deliberately come to this conclusion, there is no one thing that is more responsible for that fear than the fear of the air."

"Up to the time of the last war civilians were exempt from the worst perils of war. They suffered sometimes from hunger, sometimes from the loss of sons and relatives serving in the Army. But now, in addition to this, they suffered from the constant fear not only of being killed themselves, but, what is perhaps worse for a man, of seeing his wife and children killed from the air. These feelings exist among the ordinary people throughout the whole of the civilised world, but I doubt if many of those who have that fear realise one or two things with reference to the cause of that fear."

"That is the appalling speed which the air has brought into modern warfare; the speed of the attack. The speed of the attack, compared with the attack of an army, is as the speed of a motor-car to that of a four-in-hand. In the next war you will find that any town within reach of an aerodrome can be bombed within the first five minutes of war to an extent inconceivable in the last war, and the question is: Whose moral will be shattered quickest by that preliminary bombing?"

"I think it is well also for the man in the street to realise that there is no power on earth that can protect him from being bombed, whatever people may tell him. The bomber will always get through, and it is very easy to understand that if you realise the area of space. Take any large town you like in this island or on the Continent within reach of an aerodrome. For the defence of that town and its suburbs you have to split up the air into sectors for defence. Calculate that the bombing aeroplanes will be at least 20,000 ft. high in the air, and perhaps higher, and it is a matter of mathematical calculation that you will have sectors of from 10 to hundreds of cubic miles."

"Imagine 100 cubic miles covered with cloud and fog, and you can calculate how many aeroplanes you would have to throw into that to have much chance of catching odd aeroplanes as they fly through it. It cannot be done, and there is no expert in Europe who will say that it can. The only defence is in offence, which means that you have got to kill more women and children more quickly than the enemy if you want to save yourselves. I mention that so that people may realise what is waiting for them when the next war comes."

Educating the Population

"The knowledge of this is probably more widespread on the Continent than in these islands. I am told that in many parts of the Continent open preparations are being made to educate the population how best to seek protection. They are being told by lectures; they have considered, I understand, the evacuation of whole populated areas which may find themselves in the zone of fire; and I think I remember to have seen in some of our English illustrated papers pictures of various experiments in protection that are being made on the Continent. There is one very interesting feature of that. There was the Geneva Gas Protocol, signed by 28 countries in June, 1925, and yet I find that in these experiments on the Continent people are being taught the necessary precautions to take against the use of gas dropped from the air."

"I will not pretend that we are not taking our precau-

tions in this country. We have done it. We have made our investigations much more quietly, and hitherto without any publicity, but considering the years that are required to make preparations any Government of this country in the present circumstances of the world would have been guilty of criminal negligence had they neglected to make their preparations. (Hear, hear.) The same is true of other nations. What more potent cause of fear can there be than this kind of thing that is going on on the Continent? And fear is a very dangerous thing. It is quite true that it may act as a deterrent in people's minds against war, but it is much more likely to make them want to increase armaments to protect them against the terrors that they know may be launched against them."

"We have to remember that aerial warfare is still in its infancy, and its potentialities are incalculable and inconceivable. How have the nations tried to deal with this terror of the air? I confess that the more I have studied this question the more depressed I have been at the perfectly futile attempts that have been made to deal with this problem. The amount of time that has been wasted at Geneva in discussing questions such as the reduction of the size of aeroplanes, the prohibition of bombardment of the civil population, the prohibition of bombing, has really reduced me to despair. What would be the only object of reducing the size of aeroplanes? So long as we are working at this form of warfare every scientific man in the country will immediately turn to making a high-explosive bomb about the size of a walnut and as powerful as a bomb of big dimensions, and our last fate may be just as bad as the first."

Question of Prohibitions

"The prohibition of the bombardment of the civil population, the next thing talked about, is impracticable so long as any bombing exists at all. In the last war there were areas where munitions were made. They now play a part in war that they never played in previous wars, and it is essential to an enemy to knock those areas out, and so long as they can be knocked out by bombing and no other way you will never in the practice of war stop that form of bombing."

"The prohibition of bombing aeroplanes or of bombing leads you to two very obvious considerations when you have examined the question. The first difficulty about that is this—will any form of prohibition, whether by convention, treaty, agreement or anything you like not to bomb be effective in war? Quite frankly, I doubt it—(hear, hear)—and, in doubting it, I make no reflection on the good faith of either ourselves or any other country. If a man has a potential weapon and has his back to the wall and is going to be killed, he will use that weapon whatever it is and whatever undertaking he has given about it. The experience has shown us that the stern test of war will break down all conventions."

"I will remind the House of the instance which I gave a few weeks ago of the preparations that are being made in the case of bombing with gas, a material forbidden by the Geneva Protocol of 1925. To go a little more closely home, let me remind the House of the Declaration of London, which was in existence in 1914, and which was whittled away bit by bit until the last fragment dropped into the sea in the early spring of 1916."

Sir A. Chamberlain.—It was never ratified.

Mr. Baldwin.—"No, but we regarded it as binding. Let me also remind the House what I have reminded them of before—of two things in the last war. We all remember the cry that was raised when gas was first used, and it was not long before we used it. We remember also the cry that was raised when civilian towns were first bombed. It was not long before we replied, and quite naturally. No one regretted seeing it done more than I did. It was an extraordinary instance of the psychological change that comes over all of us in times of war. So I rule out any prospect of relief from these horrors by any agreement of what I may call local restraint of that kind."

The Abolition of Flying

"As far as the air is concerned there is, as has been most truly said, no way of complete disarmament except the abolition of flying. Now that, again, is impossible."

We have never known mankind to go back on a new invention. It might be a good thing for this world, as I heard some of the most distinguished men in the air service say, if men had never learned to fly. There is no more important question before every man, woman and child in Europe than what we are going to do with this power now that we have got it. I make no excuse for bringing before the House to-night this subject, to ventilate it in this first assembly of the world, in the hope that perhaps what is said here may be read in other countries and may be considered and pondered, because on the solution of this question not only hangs our civilisation, but before that terrible day comes, there hangs a lesser question but a difficult one, and that is the possible rearmament of Germany with an air force.

"There have been some paragraphs in the Press which looked as though they were half inspired, by which I mean they look as though somebody had been talking about something he had no right to, to someone who did not quite comprehend it. There have been paragraphs on this subject in which the suggestion was put forward for the abolition of the air forces of the world and the international control of civil aviation. Let me put that in a slightly different way. I am firmly convinced, and have been for some time, that if it is possible the air forces of the world ought to be abolished, but if they are you have got civil aviation, and in civil aviation you have your potential bombers. It is all very well using the phrase "international control," but nobody knows quite what it means, and the subject has never been investigated. That is my answer to Capt. Guest.

Civil Aviation

"In my view it is necessary for the nations of the world concerned to devote the whole of their mind to this question of civil aviation, to see if it is possible so to control civil aviation that such disarmament would be feasible. I say the nations concerned, because this is a subject on which no nation that has no air force or no air sense has any qualification to express a view, and I think that such an investigation should only be made by the nations which have air forces and who possess an air sense.

"Undoubtedly, although she has not an air force, Germany should be a participant in any such discussion which might take place. Such an investigation under the most favourable circumstances would be bound to last a long time, for there is no more difficult or more intricate subject, even assuming that all the participants were desirous of coming to a conclusion. So in the meantime there will arise the question of disarmament only, and on that I would only say a word. Capt. Guest raised a point there and pointed out quite truly that this country had never even carried out the programme of the Bonar Law Government in 1922-23 as the minimum for the safety of this country. He expressed a fear—a very natural and proper fear—lest we, with a comparatively small air force among the large air forces of the world, should disarm from that point, and the vast difference between our strength and that of some other countries would remain relatively as great as it was to-day. That kind of disarmament does not recommend itself to the Government. I assure my right hon. friend that the point which he raised has been very present to our minds, and, in my view, the position is amply safeguarded.

"I would make only one or two other observations, my desire having been to direct the minds of people to this subject. It has never really been much discussed or thought out, and yet to my mind it is far the most important of all the questions of disarmament, for all disarmament hangs on the air, and as long as the air exists you

cannot get rid of that fear of which I spoke and which I believe to be the parent of many troubles."

Mr. Baldwin then proceeded to make a somewhat impassioned appeal to youth to consider this matter, as it was the young men who would have to fight out "this bloody issue of warfare." It was for them to decide, and if the conscience of the young men ever came to feel that aircraft ought not to be used to wipe out European civilisation, it would not be done. In the course of this passage Mr. Baldwin made a striking announcement. He said: "There are some instruments so terrible that mankind has resolved not to use them. I happen to know myself of at least three inventions deliberately proposed for use in the last war that were never used—potent to a degree and, indeed, I wondered at the conscience of the world."

The Debate in the Lords

On Monday, November 14, Lord Halsbury moved in the House of Lords "that before any such proposals (*i.e.*, international control of civil flying) are agreed to on behalf of this country, full details should be submitted to both Houses of Parliament for their approval." The subject was debated by Lords Cecil, Davies, Danesfort, and Ponsonby. Then Lord Hailsham, replying on behalf of the Government, said that Lord Halsbury might be right in saying that any form of restriction of civil aviation would be mistaken, but the fact that these horrors were so terrifying was surely no reason why every possible means of averting or even minimising them should not be examined. Public debates, such as those in Parliament and at Geneva, were one of the best means of warning the people against the possibilities of unrestricted air armaments. Obviously, the Government could not make an agreement binding this country until Parliament had had an opportunity of ratifying it.

Lord Halsbury had invited them not merely to claim the right to express disagreement with the policy which the Government was adopting, but to anticipate that by passing a vote of no confidence in the Government in advance before they even knew what the Government was going to do. If the House did that, it would paralyse the authority of anybody who went to Geneva representing this country. The House should rest satisfied with the assurance that the Government could not, and would not, make any agreement except subject to the approval of both House of Parliament. The motion was negatived without a division.

The French Disarmament Scheme

An explanatory memorandum was issued by the French Government on November 14, setting forth the views of that Government on the French disarmament plan. The paragraph dealing with air armaments runs as follows:—

"In so far as aerial armaments are concerned—Article V—an essential point is covered in the general convention—namely, the forbidding of all aerial bombardment and the co-relative suppression of bombers. But by the resolution of July 23 these measures have been made conditional upon the establishment of a system assuring the prevention of military employment of civil machines.

"The French delegation proposes than an agreement shall be concluded between all the aeronautical Powers of Europe for the 'European union of air transport,' for which it has been asking since the opening of the conference.

"Finally, just as we suggest the formation of specialised detachments of land forces for the service of the League, so, for Europe at least, we suggest the constitution of an aerial force, essentially international, whose personnel would be recruited in a proportion to be determined from volunteers of all nations."

AIR SOCIETIES' MANIFESTO

Last week we published the views of Capt. F. E. Guest, Wing. Com. James, and others, on the question of Air Disarmament, and below we give a further statement on the subject.

The Royal Aeronautical Society, the Royal Aero Club of the United Kingdom, and the Air League of the British Empire, have drawn up a statement on air disarmament which has been sent to all Members of Parliament. The statement runs as follows:—

The answers to questions relating to Air Disarmament given in the House of Commons on November 2 last by the Prime Minister appear to grant almost plenary powers to the representatives of Great Britain at the forthcoming

Disarmament Conference. We, The Royal Aeronautical Society, The Royal Aero Club of the United Kingdom and The Air League of the British Empire, view these answers with grave alarm and desire to represent most strongly to His Majesty's Government the following vital considerations.

(1) The abolition of naval and military aircraft must immediately give a proportionately increased military significance to all civil aircraft (commercial and private) just as the elimination of warships would enlarge the combative potentialities of merchant and even private shipping.

(2) Whilst commercial air transport has an immense future in the British Empire as a whole, the geography

and climate of the United Kingdom, coupled with the short distances and superabundance of existing means of land communication, preclude any domestic development on the scale which will be possible for the principal nations of the Continent. Our aircraft, the majority of which must necessarily be overseas, could not get back to this country in the event of war and, accordingly, the United Kingdom would be placed in a position of permanent inferiority in the air; and London and these islands left exposed to overwhelming air attack without any means of defence.

(3) No safeguard would be afforded by schemes for the internationalisation of commercial air transport. The internationalisation of commercial air transport would merely, without producing any useful result, cripple British enterprise, which has made a most promising start in this, the newest, field of world communications—and one which may in the future prove as valuable an Imperial asset as is the mercantile marine to-day after long centuries of development.

(4) The internationalisation of commercial air transport would, further, leave the aircraft appertaining to internal flying, whether for business, sport or pleasure, untouched; and these aircraft already largely outnumber those employed in connection with commercial air transport.

(5) Any restriction on these latter categories of flying would be a measure of reaction and interference with the legitimate advance of the science of transport and the improvement of international communications which is one of the greatest forces making for mutual understanding and peace between the nations. Indeed, it would be as reasonable to curtail the development of commercial and private flying as to restrict bacteriological and chemical research on the grounds that these two fields of scientific progress can equally be misemployed for war purposes.

(6) Aircraft, judiciously employed in our Overseas Empire, have proved the most practicable means of preserving peace over large areas of the world's surface without an incalculable expenditure of blood and treasure. All political authorities of standing are agreed that experience has finally established the humanity, efficacy and economy of the use of aircraft for police work in the Middle East, on the North West Frontier of India and

elsewhere where they have saved many millions during the past decade.

(7) For example: (a) the evacuation from Kabul by the Royal Air Force of 586 men, women and children of 11 different nationalities in the winter of 1928 is held by those most competent to judge to have averted another Afghan war; (b) in the Aden Protectorate aircraft alone have been able to eject the Imam of the Yemen from the territory of tribes whom Great Britain was bound by treaty to protect and of which he had for many years been in wrongful and oppressive occupation; and the withdrawal of aircraft from Aden would inevitably result in the immediate renewal of his incursions; (c) aircraft have been used with equal effect to check the turbulence of the desert and mountain tribes in Iraq, on the North West Frontier of India, in the Sudan and elsewhere.

(8) It is therefore evident that the abolition of military and naval aircraft, coupled with the internationalisation of civil aviation, must alike endanger our national security in these islands and render impossible, unless at a prohibitive cost in terms of life and money, the discharge of our Imperial responsibilities.

(9) It would seem, therefore, that until international morality has reached a stage when there is no possibility of breaches of the Kellogg Pact, and the march of civilisation has brought about the reign of law and order in primitive parts of the world, only the possession of adequate air forces can give us a reasonable measure of security at home and overseas and enable us to seek world peace and ensure it.

(10) It is therefore our earnest conviction that His Majesty's Government should not countenance any proposals for the abolition of military and naval aircraft or the internationalisation of civil aviation which we regard as impracticable, undesirable and contrary to the national interest.

Great Britain has for years past adopted an air policy which virtually amounts to unilateral disarmament. It has profited us nothing. The principal air powers of the world should disarm to our level when it may be that we can, as a next stage, effect some further reduction, in unison with other nations, to as low a point as our national and Imperial responsibilities permit.

AIR MINISTRY RESTRICTIONS

LACK of space has prevented us, until now, from publishing further letters concerning A.N.D.11, about which we published opinions from many correspondents in our issue of November 3. Below are some which were held over last week.

An aircraft designer whose name is a household word, but who prefers to remain anonymous, writes:—

"I read your article on A.N.D.11 with limited interest because I know little about regulations.

"If a designer, old or new, studied all the regulations which exist or are imminent he would never design anything worth producing. He would be well advised to forget that any official regulations existed and to let his design be governed by practical experience. He should then construct and test his machine, and face the consequences."

Another well-known aircraft engineer, whose intimate knowledge of Government restrictions might have been expected to fit him for understanding the regulations, seems to entertain some doubt. He writes:—

"If your reading of A.N.D.11 is correct so far as the flying of aircraft produced by "non-approved" firms or persons is concerned, the new direction would seem unnecessarily to stifle enterprise.

"Some of the most interesting developments have emanated in the past and certainly will emanate in the future from "non-approved" sources, and the extent to which everything connected with flying is already subjected to official control might well daunt the experimenter. If it now comes to writing for official permission every time he wants to try his product in his own field, only the bravest of these experimenters will ever experiment, and I think it is probable that those who do will face the police court as the less worrying alternative.

"There is also the rather disquieting fact that an important new regulation affecting the liberty of people to do as they please with their own property suddenly appears complete and, so far as I know, unheralded. No one seems to know why it has appeared or who initiated it.

"I have accepted your interpretation of the direction, as I do not feel specially competent to go into the matter myself, having only just emerged from an attempt (starting with the Airworthiness Handbook) to find out whether a six-passenger machine must carry a drift indicator to qualify for a Certificate of Airworthiness. I have obtained a solution to this problem almost unaided, but it would be interesting to see if everyone would arrive at the same result. These problems vary in difficulty and reach a maximum just before the issue of a new edition when there are plenty of amending leaflets to the last editions of the documents concerned."

A pilot and constructor who may be classed as an "amateur" (because he designs and builds aeroplanes mainly as a hobby, and not because of any amateurishness in his products) deprecates the criticisms so often made of "Farnborough." It has been his personal experience that whenever he has been in trouble or in doubt about any obscure point in design, he has only had to go to Farnborough with his problems, and has there always been able to get hold of a man who could, and would, help him. (That merely supports our view that, generally speaking, officials individually do all they can to help, but they are as hampered and worried by the restrictions as are the builders of aircraft.—Ed.) For the rest, our "Amateur" designer says he is quite capable of looking after himself, and he does not expect to be severely interfered with in the future pursuit of his hobby.

In the House, on November 9, Sir P. Sassoon, Under-Secretary of State for Air, said, in reply to questions, that A.N.D.11 contained no new departure of principle, but was designed to clarify the regulations, and had been drawn up in the interests of the safety of the general public and of pilots. Another A.N.D. publication seems necessary for "clarifying" the clarified A.N.D.11! At any rate, the Air Ministry has been acting upon A.N.D.11 as if it did mean what it says.

From the Clubs

NATIONAL FLYING SERVICES

In spite of much fog and poor visibility the club machines have not been idle during the week. Mr. E. Forsyth and Lady Dorothy Clayton-East-Clayton received dual instruction and Mr. Cannon carried out a cross-country for his "B" licence. On Sunday every available machine took off for a raid on Brooklands, where the usual hospitality was received. Among the visitors during the week were Lord Clive, who took dual instruction, Sir Anthony Hope, who flew one of the club's machines, and Col. the Master of Sempill, who arrived back from Germany in a Desoutter after a cruise to South America in the *Graf Zeppelin*. He had been forced down in the hills north of Friedrichshafen by very bad weather, and owing to heavy load was unable to get off again, which necessitated several trips being made to Friedrichshafen before he was able to make a fresh start for England.

LONDON AEROPLANE CLUB

The club are sorry to lose Dr. Houston, who is returning to his home in Australia; during the 200 hr. which he has flown at the club he has never done the slightest damage to aircraft, and the best wishes of the club will go with him. Once more is a D.H. 53 to be seen on and above the aerodrome, the newly acquired property of Mr. F. G. Fisher. New recruits during the past week include Messrs. Elliott, Grey and Daniels. The dance committee wish to remind all members of the club, and of other clubs, that the annual dinner and dance will be held at the Park Lane Hotel on December 14. Tickets (30s. double or 17s. 6d. single) may be obtained from the Dance Secretary, Stag Lane, or from 119, Piccadilly, W.1.

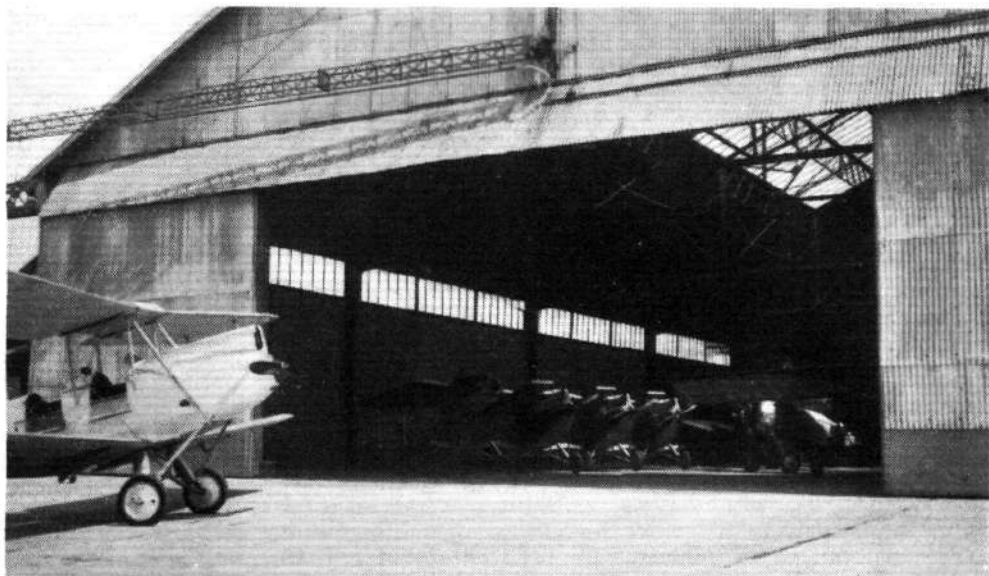
BROOKLANDS

Activities during the week have been considerably hampered by fog, which has reduced the amount of instruction possible. One first solo has to be reported again this week—that of Capt. Silver, who went off on Wednesday and made a very creditable circuit indeed. Mr. Van Marken has left on one of his periodical trips to the Continent, flying to Amsterdam in his own "Puss Moth," with Mr. Hordern. Last week he flew to Shanklin in rather bad weather but got through the mist successfully. He is, of course, a very experienced pilot with quite a number of hours to his credit. On Saturday eight machines flew over from Hanworth, including Mr. Brie's Autogiro, and the occupants had lunch in the club; this was the first time that some of them had seen the new clubhouse from inside. In the morning Mr. Lowdell flew a passenger over to Reading. Mr. Hills, who is at Eton, has commenced instruction, and Mr. Barker, who began flying during his Christmas holidays and took his "A" licence this summer, has also been using YI. Mr. Trelawney has paid us a visit from Lympne in his own machine, and is staying here to obtain his "B" licence. He is taking a course under the Ground Instructor. The lecture room, although the new system of instruction has only been in force for a few months, has already become a popular rendezvous. Airmen are not especially keen—like most other mortals—on being made to appear stupid in front of their friends, or to take any kind of class instruction along with other flying men. A short time ago it was decided to make arrangements for individual instruction. The Lecturer can now be booked at any time, like a dentist—though the session is generally very much more enjoyable than one in the surgery! Instruction is given at a small fee in all subjects connected with flying, and both school pupils and private owners come regularly for lessons. In addition, the Ground

Instructor is taking on the rôle of a helpful friend, full of odd scraps of advice when difficulties arise, and generally able to solve any problems which crop up in a day's flying. In the evening the Lecturer is taken over by parties of Boy Scouts and other youngsters, to whom he gives elementary lessons at a fee of a few shillings. Capt. Ledlie, of Personal Flying Services, Ltd., has been on a trip to Scotland with the Junkers monoplane, and the big machine seems to have aroused some interest there. The machine is kept very busy on taxi work these days, and is seldom in the hangar. The new tarmac is now well advanced, and most of it is available for use by machines. It has already proved a boon to Brooklands habitués, and the dust clouds which usually attend the running-up of machines have been avoided. The Control Office has just been done up and repainted, and now looks very spick and span.

AIR SERVICE TRAINING

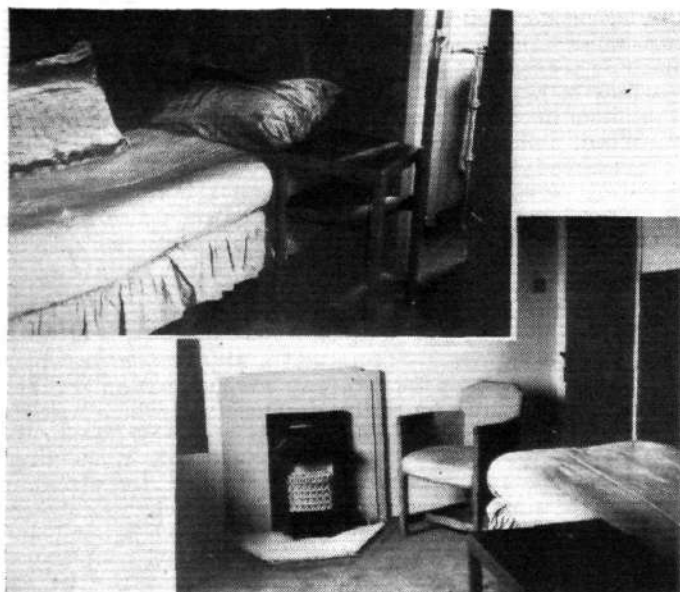
New wireless instructional rooms are nearing completion; they comprise a lecture and a Morse room in which each desk is wired up for two-way communication between instructor and pupil; a series of cabinets in which wireless traffic practice can be conducted; a generator room; an accumulator charging room; a demonstrating room fitted with obsolete and unserviceable equipment for stripping practice; a standardised Marconi A.D.6M set, and a main station affording intercommunication between ground and machines in flight. The various instructional courses will in future start on specified dates, as follows:—The 3-4 years' course, for pupils desirous of taking up aviation as a profession, will start on February 6 and September 18. The "B" pilots' licence course on February 6 and every six weeks following. The 2nd class navigators' course on November 21 and June 26. The ground engineers' course on February 6 and September 18. The wireless course on February 6 and at intervals of every four and a-half months. A short wireless course, for qualified W/T air operators who have no experience on Marconi A.D.6M, on the first Monday of every month. Blind flying, instructors', advanced flying, seaplane training and night-flying courses can be taken at any time. W. D. Campbell, an American, and E. H. Weelwright qualified for "A" pilots' licence, Maj. W. H. Vetch, chief instructor of Bombay Flying Club, completed the instructors' course and obtained A.S.T.2 A.2 certificate, Mr. L. C. Lee Murray completed his blind-flying course and Mr. L. M. Williams finished all tests for his "B" licence. New arrivals who are taking the 3-4 years' course are P. W. Kennedy, F. V. Hollins and R. G. Ryott.



FROM FRANCE: In front of the Fronval Hangar at the Morane Saulnier aerodrome at Villacoublay. It is used by the Leon Morane Club and named in memory of the well-known French Ace, Fronval.

BRISTOL AND WESSEX AEROPLANE CLUB

The club's flying time for the month of October has amounted to 76 hr. 5 min., made up as follows:—Dual, 26 hr. 30 min.; solo, 24 hr. 30 min.; passenger flying, 14 hr. 30 min.; test flights, 10 hr. 35 min. The club is pleased to hear that F/O. Cope has joined the Cardiff Club as Instructor. It is understood that this appointment is temporary only, but his old club wish their late instructor the best of luck when the time comes for Cardiff to make a permanent appointment.



COMFORT AT HESTON: Pilots who wish to make early morning starts can now obtain luxurious sleeping quarters at Heston Airport, thus obviating the necessity of leaving the aerodrome. (FLIGHT Photos.)

READING

The Reading Aero Club dance was held last Saturday, over 70 members and friends being present, which exceeded

**Death of Maj. Gen. Sir W. Salmond**

We regret to learn of the death on November 8 of Maj. Gen. Sir William Salmond, K.C.B., the father of Air Marshal Sir Geoffrey Salmond and Air Chief-Marshall Sir John Salmond. Sir William was born in 1840 and so was in his 93rd year. He was commissioned in the Royal Engineers in 1857 and retired from the Army in 1902. He was appointed Colonel Commandant of the Royal Engineers in 1915. We feel sure that all our readers will join with us in offering condolences to his two distinguished sons.

Atlantic Airman Dead

THE death has occurred in Chicago of Mr. William Brock, who attempted to fly round the world from America. In August, 1927, he and Mr. E. F. Schlee crossed the Atlantic in a Stinson-Detroit monoplane fitted with a Wright Whirlwind engine. Mr. Brock was taking no chances for his machine carried petrol for 35 hr., two compasses, a sextant, an air raft, and a kite to fly the aerial of a small transmitting set for use in case of a forced landing. Adequate maps were deemed unnecessary, with the result that the airmen missed Ireland and finding themselves over Devonshire did not seem sure that they were even in the British Isles until, in answer to several dropped messages, a Union Jack was displayed on the ground. Eventually the machine arrived at Croydon, where Mr. Brock was provided with maps to assist him on his way to India. On reaching Japan the flight across the Pacific was abandoned.

Sir Dugdale Clerk

SIR DUGDALE CLERK, K.B.E., F.R.S., who died last Saturday in his 79th year, is known the world over for the valuable inventive work he did in connection with internal combustion engines. In 1881 he discovered an alternative to the Otto cycle and constructed a two-stroke engine. Thereafter he did much research work on the specific heat of gases, and on explosive pressure, which led, in 1908, to his election as a Fellow of the Royal Society. During the war he served as member of the

the highest hopes of the Committee; a spot dance was won by Mr. G. Ward and Miss Sheila Small, who each received a ticket entitling them to a free flight. On Sunday the Leicester Club collected their "Gipsy Moth," which has been overhauled for the renewal of its C. of A. in the shops of Phillips & Powis Aircraft, Ltd. The new hangar is rapidly approaching completion, and alongside it Mr. Miles has his own drawing office and workshop in which is being built a machine which should be ideal for private owners who have many demands on their bank balance.

THE NEXT "JUNIOR"

We would remind readers that the annual dinner of the Junior Aero Club will be held at Ye Olde Ham Bone Clubbe, 15, Ham Yard, Great Windmill Street, W., on December 6, at 8 p.m. Lt. Col. F. C. Shelmerdine, Director of Civil Aviation, will preside, and the guest of honour will be Mr. C. W. A. Scott. Tickets, 4s. each, should be booked in advance.

MAIDSTONE

In spite of the winter months a high average of flying hours is being maintained. On November 13 a "Scavenger Hunt" was held which was well supported by members and friends. The club annual dance will be held on December 10, the tickets being 10s. 6d. each; a motor coach will leave 126, Long Acre at 7 in the evening and those desirous of seats should apply to the Secretary.

ANTWERP AVIATION CLUB

On November 5 the club celebrated its 5th anniversary. When it was founded there were 22 members, of whom 17 were pilots; to-day there are 136 members, of whom 62 hold pilots' certificates. In spite of trade depression over 700 hr. have been flown during the past year on the club machines, R.S.Vs. with Anzani or Renard engines and on "Puss Moths" and "Gipsy Moths" owned by members. On Saturday 92 members and friends attended a luncheon held in the Airport Restaurant, after which a landing competition was held, won by Monsieur Pierre Schellekens. On Sunday there was an interesting lecture on "L'Aviation Britannique" given by Mr. H. R. Gillman, Secretary of the Society of British Aircraft Constructors, who spoke in French before about 1,000 people.



Advisory Committee for Aeronautics at the Air Ministry, chairman of the Internal Combustion Engine Committee, member of the Air Invention Committee, and member of the Panel Board of Invention and Research.

Mr. H. G. Watkins

At a meeting of the Royal Geographical Society the President, Admiral Sir Richard Goodenough, paid a glowing tribute to Mr. H. G. Watkins, who lost his life in Greenland while serving the interests of science. "Some hopes are quenched but not extinguished, some projects delayed but not abandoned," said the President in the course of his speech, which, incidentally, is a sentiment peculiarly applicable to many projects undertaken in the interests of aviation. At a memorial service held at St. Michael's, Chester Street, on the morning of November 7, there were present Col. and Mrs. Watkins, Lt. Col. F. C. Shelmerdine (representing the Secretary of State for Air) and Group Capt. Edmonds (representing the Air Council).

A Russian Aircraft Scientist

CONSTANTINE TSIOLKOVSKY, a Russian school teacher aged 75, who has been studying the problems of flight, and is said to have anticipated the theoretical work of the Wright brothers and of Count Zeppelin, has lately received public honour at a meeting in Moscow. He is said to be now designing a rigid airship with a metal cover, and to claim that he can regulate its height by heating or cooling the hydrogen.

The Work of the Airspeed Ferry

THE two Airspeed "Ferry's" (two Gipsy II's, one Gipsy III), which formed part of Sir Alan Cobham's fleet during his tour of the country throughout this year, have between them made over 9,000 landings, and have carried nearly 92,000 people in a flying time of about 640 hr. These machines were out in the open, subject to all weathers, throughout the whole of this time, and yet do not appear to have suffered unduly. The engineer in charge of overhaul states that they have proved to be exceedingly easy to maintain.

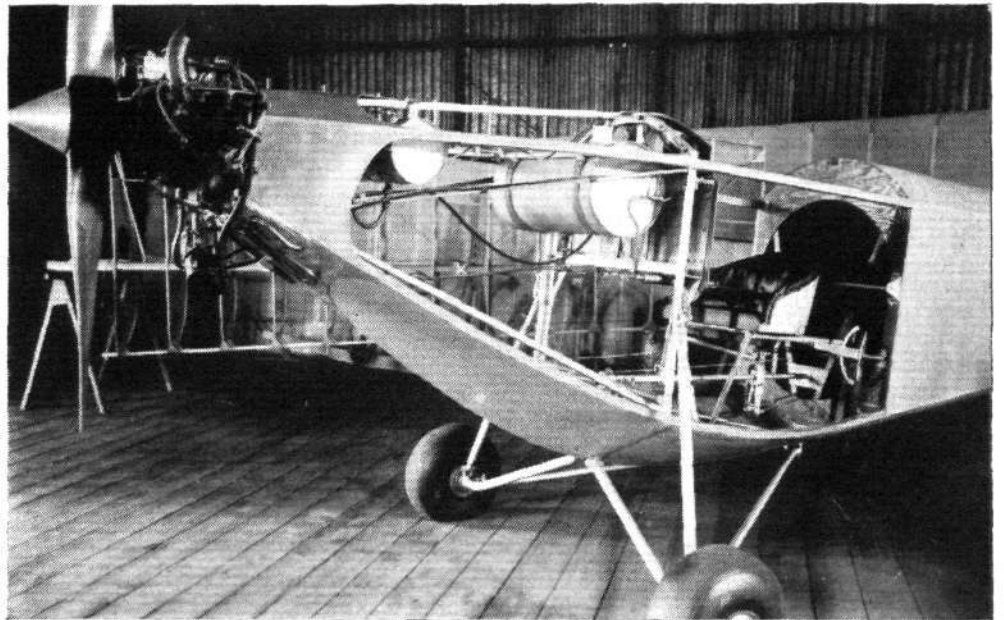


ON SAILPLANE PRINCIPLES

High Aspect Ratio, Flexible Trailing Edge, Rotating Wing Tips

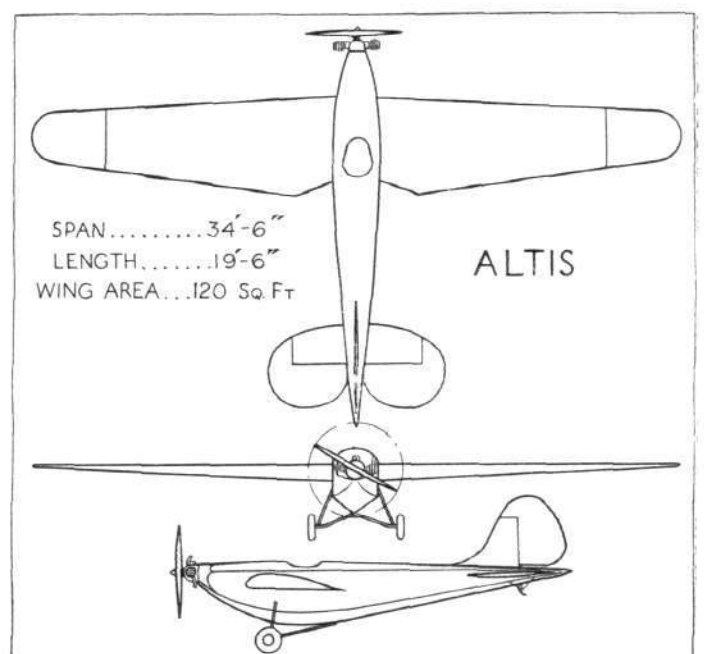
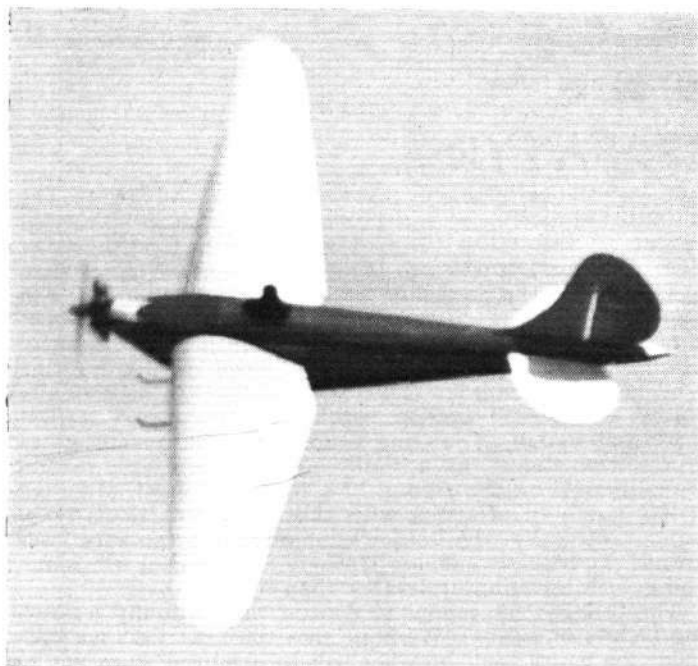
WE are now able to give our readers further information of that interesting little single seater aircraft built in the Transvaal, South Africa, the first photographs of which we published last week. This machine was built in order to test out, in powered flight, a few of the ideas which the designer gained as the result of gliding and soaring. The particular features referred to, include high-aspect ratio, flexible trailing edges, rotating wing-tip control and single-spar construction. It should be borne in mind that this aircraft had to function satisfactorily in a locality the altitude of which was 6,000 ft. above the sea level. This, the first machine, has admittedly been built somewhat heavier than is necessary, and it is estimated that at least 90 lb. could be saved upon subsequent models.

The wing section is one developed by the designer from a combination of the experience he has gained in sailplane construction and also from study of the flight of vultures.

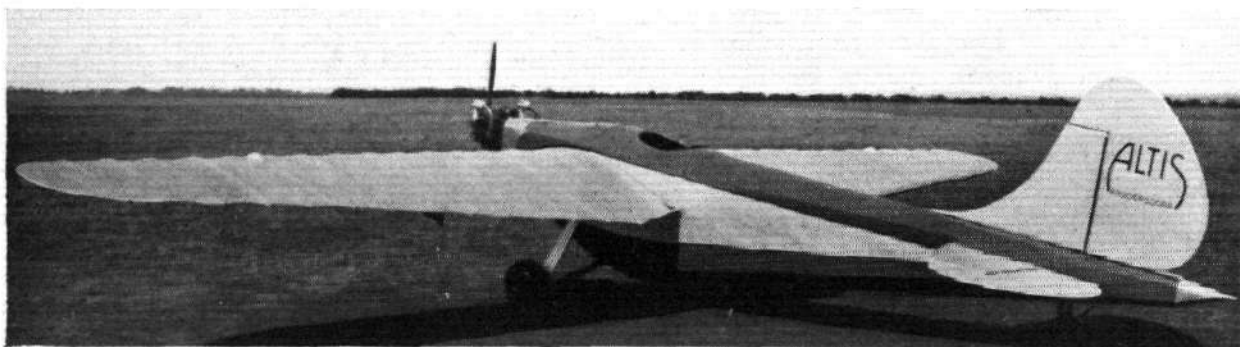


In the three-quarter front view above the clean lines of the "Altis" are very clearly shown, while below the peculiarly "birdlike" form of the fuselage is brought out.

The trailing edge is flexible for 30 per cent. of the wing chord, along the complete span of the wing, including tips. The wing, as can be seen from the photographs, is of full cantilever construction, with a spar depth at the root of $10\frac{1}{2}$ in., tapering to $\frac{3}{4}$ in. at the extreme tip. The rotating-tip control has been found peculiarly adaptable to the



On the left the "Altis" is shown in flight, while on the right our general arrangement drawing emphasises the clean lines of this little aeroplane.

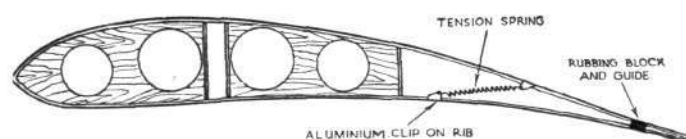


This three-quarter rear view of the "Altis" brings out the wisdom of the adage that "when an aircraft looks right, it generally is right." The tail units in particular appear very sensibly planned.

single-spar construction, owing to the elimination of torsional stresses, whatever may be the incidence of the tip in relation to the wing. The spar roots slide into a frame forming the main bulkhead of the fuselage where they butt, and are pulled together by nickel-chrome steel screwed couplings. The wing tip itself has a square-section boxed plywood spar, which slides over, and is bolted to, a duralumin tube of 17 gauge by 2 in. diameter, which, as can be seen in the drawing, is mounted on the main wing spar by one plain bearing and one tapered roller bearing.

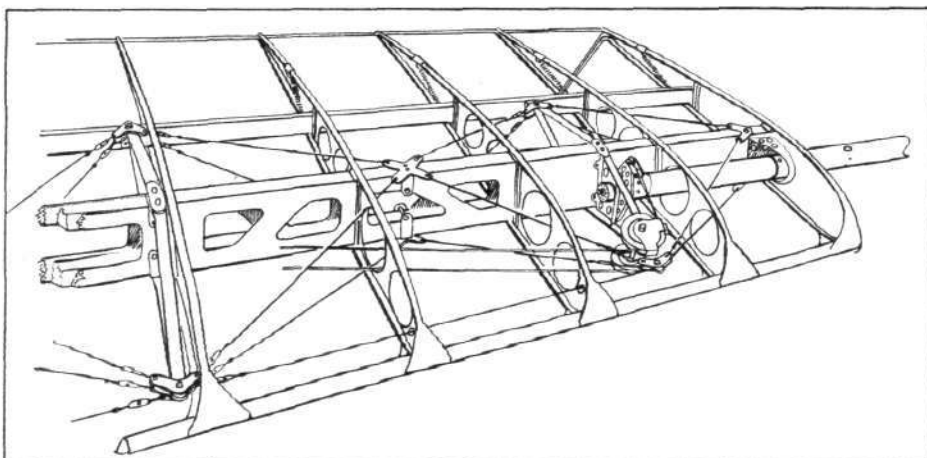
The fuselage is of fairly normal wooden construction and is plywood covered. The tail surface controls are all internal and the tailplane is adjustable from the cockpit; the engine at present fitted, is an A.B.C. "Scorpion," which is bolted on to a steel plate supported by steel tubes extending from the main bulkhead of the fuselage. The chassis is of straightforward design, with bent axles pivoting on fittings at the base of the main fuselage bulkhead,

while the shock-absorbing struts are of the steel-tube type containing a spiral steel spring. Goodyear 16-in. air wheels are fitted. The machine has now accomplished numerous cross-country and test flights, and has been found pleasant to fly in every way. The controls are very sensitive, and horizontal flight can be maintained at 37 m.p.h.



Above is the method of obtaining the flexible trailing edge. The top and bottom rib caps are both free to slide. Below the drawing shows the method of bracing the single wing spar. The tube at the end carries the rotating tip.

Weight, empty ..	530 lb.
Petrol	6½ gall.
Oil	1¼ gall.
Wing Loading ..	6 lb./sq. ft.
Power Loading ..	27 lb./h.p.
Take-Off Speed ..	33 m.p.h.
Cruising Speed ..	60 m.p.h.
Top Speed	71 m.p.h.
Span	34 ft. 6 in.
Length	19 ft. 6 in.
Chord, Max. ..	5 ft. 3 in.
Min.	2 ft. 3 in.
Wing Area, with tip ..	120 sq. ft.
Area, each wing tip ..	10 sq. ft.
Aspect Ratio	9.9:1



THE MILES "SATYR"

A SHORT flight on this aeroplane, which has been privately built for his own purposes, and not for production, by Mr. F. G. Miles, who has recently joined Phillips & Powis for the design and production of other aeroplanes, reveals the fact that he has achieved his object, which was to produce a small and lightly loaded aeroplane, of extreme manoeuvrability with freedom from vice.

Eyeing the aeroplane before flying it, one notices the concentration of weight, the engine (a Pobjoy "R") being not unduly protuberant, and the cockpit being well up to the centre section.

With a wing loading of about 6.6 lb./sq. ft. and a remarkably short span and length, it was evident that the aeroplane would be manoeuvrable even at low speeds. It was surprising, however, to find that it could be consecutively rolled at about 70 m.p.h. without the slightest trouble. In flight, the first and one of the most appealing features is the climb. Although not up to some other aeroplanes recently flown, as regards physical impression of steepness, the actual rate was surprising. Unlike some aeroplanes, the pilot can actually see where he is going during quite a steep climb. In fact, the blind spots are

few, and the aeroplane in this respect shows advance. The controls are nicely co-related and steep turns can be carried out at all throttle settings, down to 50 m.p.h. to either side. The turning circle to the left is somewhat looser than to the right. The aeroplane shows no vicious tendencies in respect of spinning, although thoroughly foul weather rendered prolonged spins impossible. Considering its small dimensions, there was a notable absence of any hunting tendency on rudder or elevator, and the tail successfully dodges down-wash except, perhaps, to the very smallest noticeable extent at landing incidence. The undercarriage is resilient almost to a fault, and the machine readily manoeuvrable on the ground in a 15-m.p.h. wind, although it has not been arranged with this feature particularly in mind. Naturally, the Pobjoy engine ran very sweetly. We always find these engines strongly reminiscent of something with an armature rather than a crankshaft.

The "Satyr" is joyous to fly and has unusually reassuring factors of safety. We hope that the next time we take it up the petrol tank breather will be arranged so as not to ruin our complexion during inverted flight, because on this aeroplane it is positively wicked to stay wheels downward for more than a few seconds at a time.

A Flight in Russia

By JOHN GRIERSON

(Concluded from page 1045)

Permit Granted for Samarkand Flight

RETURNING to flying, it happened that, just as I was on the eve of departing to London, my Astrakhan-Samarkand permit was granted.

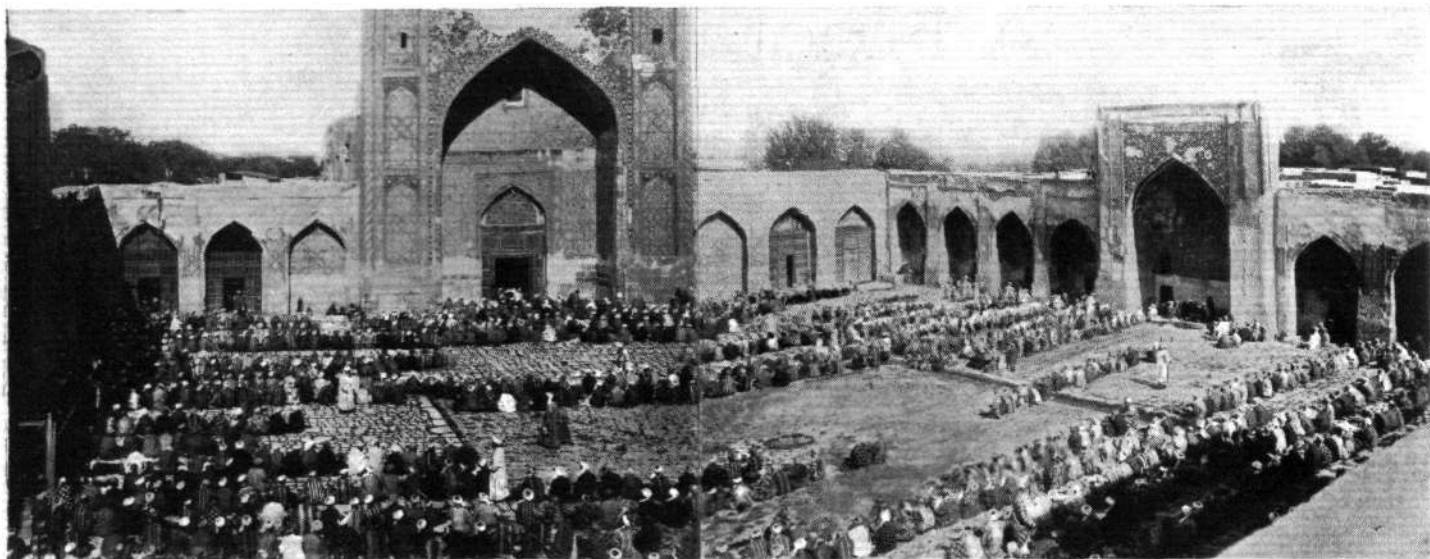
Now I was strictly ordered to follow the route Moscow-Voronej-Stalingrad-Astrakhan-Chelkar-Turkistan-Tashkent-Samarkand, and return by exactly the same path, and, remembering Minsk, I thought it would be best to follow my instructions. For maps, I had my own millionth-scale one as far as Astrakhan, and Aeroflot unearthed a genuine antique pre-revolutionary map covering the area beyond, with names in old Russian and a scale of 34 miles to the inch. As it was very valuable, and the only one they had, I was to be sure to return it.

Early I set off in fine weather across huge tracts of agricultural lands, where roads, railways, and even lakes had sprung into existence since my map had been made. A curious feature I noticed was the frequency of fields marked out as landing grounds. Soon, however, observing an aeroplane flying up and down a field at a low altitude, it dawned on me that either dusting or sowing by the latest methods was in progress, hence the landing grounds. I had been forbidden to land at Voronej, and it had taken some argument to obtain permission for Stalingrad. Nevertheless, I actually had no desire to land at either of these places, for the following wind brought me over the 850 miles to Astrakhan in 8½ hours non-stop. Since on leaving Moscow I had been weak, it was no wonder that now I was utterly dead beat. Therefore I decided to stay two days so as to recuperate for the hardest part across the desert. As not a soul spoke English at Astrakhan, and there was an unfriendly feeling about the town, I determined more than ever to carry on. Nevertheless, when I eventually set off for Chelkar, I was in such poor condition that swinging the propeller was an effort demanding a sit-down rest every four swings. Now, with my ancient map, I set course for the Caspian across the many mouths of the Volga, but was unable to recognise a

single feature on that deserted salt-marsh coastline until I found Gurief, a town marked fifteen miles from where it really was. Continuing eastwards, my next pinpoint was to be a town, a railway terminus, and a river joining the sea in the north-eastern corner. True, I saw a town ; true, I saw a river of sorts which promptly disappeared into a marshly lake ; but nowhere was a railway or the remains thereof to be seen. Thus I strongly suspected that this was the wrong town, and therefore went into the desert to look for the railway. But as a two-hours' search proved fruitless, I lost all confidence in the map, and turned back to Astrakhan. Certainly I might have flown a compass course across this wolf-infested area, inhabited by hostile nomads, but, as no one had flown in the sector before, the possibility of magnetic disturbances was not to be neglected. Moreover, Comrade Feldman had forbidden me to fly blind over any portion of this desert ; so, in the event of trouble there, no sympathy would come from Aeroflot. Having barely strength to work the hand petrol pump, and tired out to the limit, I did a drop landing at Astrakhan that would have shamed a beginner. Moreover, my feelings were only partly relieved when I was told that the railway I had searched for never existed!

Next day I did the only thing I could, and raided the emergency rations. Finding a bottle of chicken breast, appropriately labelled "Specially recommended for invalids," I revived my exhausted body as I flew a new route to Gurief, then up the River Ural to Uralinsk, from where the foundation of an old railway led me to the main line, which in turn took me on to Aktiubinsk. Incidentally, I discovered that the Kirghiz "Steppes" are a myth so far as the Ural is concerned, for I saw nothing but stark, sandy desert the whole way to Uralinsk. As the Aeroflot people had wanted me to go to Aktiubinsk in the first place, I thought I could probably get away with this breach of regulations, as, indeed, I did. Now I was on the main Moscow-Tashkent airline, and all the aerodromes were provided with intelligent keepers.





RELIGIOUS FERVOUR: During prayers, at the celebration of Kurban Bairam, inside the mosque Tillakari, at Samarkand. Each year there is a smaller number of worshippers. Photograph taken in 1927.

On the Last Lap

The following day I traversed the Kizil Kum desert and skirted the Aral Sea to Kizilorda. Here I heard English spoken for the first time in six days, and I was made very comfortable. I only had a short journey next day to Tashkent, but I broke it at Turkestan to tighten a landing wire.

Tashkent has a large military aerodrome with hangars, though, as usual, "Rouge et Noir" had to stay out.

Just over two hours' flying brought me to Samarkand, which is the finest old town I have ever seen. All its buildings are richly embossed with enamel bricks of rarest hues, and had I not felt that it was only a matter of time before the body crocked up altogether, I should have stayed several days admiring the sights. The surrounding country was very similar to the N.W. Frontier Province of India—the irrigated plain with the towering snow-peaked mountains in the distance. Here I was given an English-speaking guide, who showed me all he could in a day, but after that I was determined to hurry home and make Moscow in 2½ days.

Returning in Record Time

The first day of the return flight brought me to Chelkar, with one stop at Kazilinsk, where the officer in charge was most efficient, and treated me with the greatest kindness. No food was available at Chelkar, but I carried on with a handful of raisins and a few malted milk tablets each day. Since I had decided never, never to return to Astrakhan, I allowed the map of that area to blow overboard soon after leaving Atkinbinsk. Now, having the excuse that I had a map for Stalingrad and none of Astrakhan, I flew 200 miles east of Uralinsk until I got on to the Stalingrad Sheet, finally getting through to the Volga basin and down to Stalingrad all right. Unheralded as I was, the military authorities patiently heard my story, and then treated me with the very greatest consideration and kindness. When I left in the morning there was such a strong head wind that Moscow was only just reached within the 2½ days I had allowed myself. This time, I believe, is a record from Samarkand, though the Aeroflot people refused to deny or confirm it. I had done over 60 hours' flying since I left Moscow, and the sole replacement was one valve spring, the broken one being discovered in the daily inspection on return to Moscow.

Having been held up by the exasperating delays of everyone I had to see in Moscow, my intended 12 o'clock start next day for Veliki Luki actually took place at 3.25 p.m., so late, in fact, that my landing would probably be in the dark. As a result I was made to sign a "blood chit" for leaving without a weather forecast, but they promised to have Veliki Luki aerodrome lit up. My route lay over miles of dense forest, with the railway as company for the last half-hour. Fortunately, the weather kept good until I met the single track, and then it did all it could. The lowness of the clouds caused premature darkness, but running at nearly full throttle brought me

to Veliki Luki with ten minutes' daylight to spare. Then followed a fly round to look for the aerodrome, which was not where the map marked it, a landing in a field to ask peasants the direction of the aerodrome, continued failure to find the expected array of lights, and finally a landing at the last possible moment in the growing darkness in a field. Here I was straightaway surrounded by an unpleasantly odoured crowd of peasants, who put their hands all over the machine, until the aerodrome people arrived two hours later. A sentry was then set over "Rouge et Noir," and I was accommodated in a nearby hut. In a small room containing the tenant and four soldiers, a board with a straw mattress at the side of a hot stove was provided for me. I was given tea to drink, but after one bite of the proffered black bread, which contained grit, I ate nothing. At the end of a restless night in that fug-room (for all windows were shut and the soldiers smoked) I arose early and made to go off. The soldiers, however, pointed at their bayonets menacingly, but I pretended I could not understand, and pushed my way through the door. Unfortunately, I was laden with flying kit and luggage, so that I was easily caught and pulled back into the hut. Later I made a dash without kit, and had actually reached "Rouge et Noir" when the sentry pushed me off, so I had to submit to two hours' detention before a written order arrived authorising my release.

Home Again

The story ends with four days' flying against 40 m.p.h. winds, mostly in heavy rain, an unhappy night at Kovno (the first non-Russian stop), where a complete duck and a beef steak failed to revive the overdriven body, a forced landing due to fog near Berlin, where Hitler's storm troops entertained me, and the final ghastly struggle up to Brooklands after two hours' dithering at Lympne.

Looking back on this, the most strenuous flight I have ever undertaken, I should hate to have missed a single moment of it. Eight thousand eight hundred miles had been flown in 107½ hours' flying, and the total engine trouble had been one fractured valve spring, a striking testimony to the sound design and uncanny reliability of the modern British aeroplane and its engine. Although illness and the utterly hopeless task of trying to get Russians to hurry had provided considerable difficulties, I had visited places where few others have been. I had seen two weeks of Communist life in Moscow and had had an insight into the religious enthusiasm which is driving forward the Five-Year Plan. I had had little adventures and experiences I shall never forget.

Therefore, to those who are young and healthy, and who enjoy a glimpse of the unusual, I recommend a flight to the Land of the Soviets.

Factors assisting this flight in my D.H. "Moth" (Gipsy I) to be brought to a successful conclusion were:—Russian oil and spirit; Kelvin, Bottomley & Baird Mk. IV compass; K.L.G. sparking plugs (an old set used in the *Morning Post* race); Palmer wheels and tyres; B.T.H. magnetos; Titanine dopes and varnishes.

AIRSCREW DESIGN

THE paper under above title, read by Mr. D. L. Hollis Williams, B.Sc., A.F.R.Ae.S., of the Fairey Technical Staff, before the Royal Aeronautical Society on November 10, was an intensely interesting one to the specialist, but as airscrew design is still, and is likely to remain, rather in the nature of "dark magic" to most people, and space is very scarce in FLIGHT this week, we have not room to give the paper in full.

The subject of the variable pitch propeller is, however, one which interests most people, and Mr. Hollis Williams' estimate of when a V.P. propeller is and is not worth fitting deserves to be placed on record. Not all will agree with him, but this is what he said concerning the variable pitch airscrew:—

The variable pitch airscrew presents a difficult mechanical problem, as is evidenced by the few examples in every-day use, but judging from the number of schemes produced it might be supposed to be a very desirable aid to aircraft performance.

When the problem is examined in detail, however, it is found that in many cases the variable pitch airscrew does not warrant its introduction, with the attendant complications. A principal reason for this is the restriction applying in this country that "normal" engine speed shall not be exceeded on climb. It is a common experience to find that, for general-duty aircraft, an airscrew which is designed for maximum engine speed at full throttle in level flight will, with a fixed pitch airscrew, develop maximum climb at approximately normal engine speed, so that variation of pitch will not assist general performance on this class of aircraft.

The handicap of the engine limitation is partly due to engine designers having accommodated the fixed pitch airscrew and to maintenance reasons, but even so, when considering exceptional aircraft with some performance feature highly developed to the detriment of the other performance characteristics, an opportunity occurs for improving these by the use of a variable pitch airscrew. Some conditions under which variable pitch may be used to advantage will now be briefly examined.

An example of successful use of variable pitch is the landplane speed record recently set up in America. To design an airscrew to absorb the engine torque at a high value of forward speed a large pitch value is necessary, and, in consequence, difficulty is experienced at the take-off, since the airscrew blades are initially stalled. This is overcome if a variable pitch airscrew is used in such a way that the full thrust of the racing power is made available for take-off.

For unsupercharged engines, speed can only be materially improved if the specification requires maximum engine speed to occur at height; so that below that height engine speed may be regulated by change of pitch instead of by reduction in throttle opening to obtain an increase of speed at the lower altitudes. Climbing, as mentioned, must take place at "normal" engine speed, but, if the aircraft speed range be large enough to permit an increase in engine speed on climb, then the time to height would benefit.

On a supercharged engine the advantages increase as the supercharging pressure at height increases. If the engine is maintained by the throttle at constant boost pressure below the "full throttle height" it will develop an almost constant torque throughout this range. The fixed pitch airscrew is usually designed to absorb this torque at the "full throttle altitude," so that it is unable to deal with it in the higher air densities of lower altitudes, with the consequence that engine speeds and power are held down, and hence both speed and climb are reduced. With a variable pitch airscrew, however, the pitch is reduced to give maximum permissible engine speeds both for climb and top speed, and the loss in efficiency due to the higher engine speed caused by this pitch reduction is small compared with the power increase, so that the resultant performance is considerably improved.

At heights above the design altitude of the airscrew, for a given value of V/nD , the power absorbed by a fixed

pitch airscrew is, of course, proportional to the relative density of the atmosphere in which it works, and for normally aspirated engines and for supercharged engines above the "full throttle height" the power falls off with increasing altitude somewhat quicker than the relative density of the surrounding air. Hence, as an airscrew under these conditions proceeds to increasing height above the altitude for which it was designed, the torque required to turn it at a given value of V/nD , gradually becomes larger than the torque available from the engine so that the engine speed falls, and this again can be mitigated by a variable decrease of pitch. The gain in performance, however, remains small.

A reduction in pitch for take-off to permit maximum power output will be more favourable to the argument for variable pitch if the blades of a corresponding fixed pitch airscrew are initially stalled, as for example on high-speed aircraft and types with highly supercharged engines operating at height; but on all aircraft the reduced pitch under static conditions gives improved airscrew efficiency as well as increased engine speed and power for all stages of the take-off.

For a specially designed long-range aircraft, the situation is better coped with by variable pitch. The difficulty in take-off with large fuel load can only be met for a fixed pitch airscrew by using a low pitch which absorbs full power at a speed little in excess of the initial cruising speed. This condition leads to a pitch diameter ratio of about .5, and since in the maximum pitch condition it is expected not to exceed a value of .9 there will be a definite gain in efficiency, especially at the relatively high cruising speeds entailed, which, added to the improvement in consumption, results in a range improvement to the order of 15 per cent. Additional advantages of the variable pitch airscrew are increased gliding angle through the negative thrust at low pitch, and increased speed of dive at high pitch as the engine may then be actually developing thrust without over-running.

The feasibility of changing to a variable pitch, it is seen, is not determined by any general solution, but is a question for detailed consideration in any given example. For the less standard types of aircraft variable pitch is seen to be of use, especially for take-off and range, but for general duty types no appreciable improvement is possible with engine design as so far developed.

Successful mechanical design of variable pitch airscrews depends upon solving three groups of difficulties: Firstly, provision for anchoring the centrifugal tension of each blade without undue frictional resistance to twisting of the blade; secondly, means of reacting, at the root of each blade, the resultant bending moment from air loads and centrifugal force, again avoiding excessive friction; and thirdly, the method of varying pitch, whether manually operated or automatic with engine speed, including the interlocking of the blades to prevent independent action.

When it is recalled that the steady centrifugal pull of a blade on a moderately large variable pitch airscrew may be 50 tons it is realised that design of an adequate thrust bearing presents a difficult problem as the blade must be twisted in its socket to achieve variable pitch while under this load. Ball and roller bearings have been used successfully, but this part of the problem has been avoided in some examples by joining the pair of blades with a tension member that is sufficiently weak under torsion to allow the blades to twist through the few degrees required, yet elastic enough to offer some support in this direction.

The socketing requires special attention as the blades are necessarily movable and therefore to an extent alive and will consequently tend to work in their bearings, and under these conditions and the resulting high local stresses the problem of avoiding adhesion at once arises and must be solved to avoid partial seizures.

It is most desirable that variable pitch airscrews be available for a few important applications, and these remarks will indicate the difficulties that have to be overcome. Fairly wide use has been made of earlier schemes in America, and in this country considerable progress has been made towards successful solution and development.



Rolls-Royce "Condor" C.I. Engine

Type Test Successfully Passed

THE Rolls-Royce "Condor" compression ignition engine has successfully passed the Air Ministry's civil engine type test of 50 hours. Flight tests are now being undertaken at Farnborough in a Hawker "Horsley" aircraft. The engine gives a maximum of 500 h.p. and weighs, with starter and accessories, 1,504 lb. The conversion of the Rolls-Royce Condor petrol engine to the compression ignition system was initiated by the Air Ministry and has been developed at the Royal Aircraft Establishment, Farnborough, with the co-operation of Rolls-Royce, Ltd., which produced such components of the engine as required modification.

Compression ignition engines have usually been designed with a substantial increase in strength and weight in anticipation of increased stresses, but in the case of the "Condor" the problem was approached from the other direction, viz., to ascertain how much increased strength was required to be added to an existing petrol engine to secure completion of the normal type test requirements for civil use when employing heavy oil as fuel. The engine has now completed the standard civil type test modified to suit C.I. engines, the duration of which is 50 hours. It is the only C.I. engine which has completed this test in this country with the exception of the Beardmore "Tornado" which was installed in the airship *R.101*, and was of a considerably higher weight to power ratio, being designed to suit airship conditions.

The "Condor" engine is now being subjected to experi-

mental flight tests in a "Horsley" aircraft at the Royal Aircraft Establishment with a view to exploring the problems of the operation of C.I. engines in flight, including the effects of altitude and low temperatures and ease of handling and control. It is hoped also to establish by practical test the theoretical advantages of low fuel consumption and cost under cruising conditions and to find out the extent to which the size of the radiator and weight of cooling water carried can be reduced as compared with standard petrol engines.

This is only one of a number of experiments which are being made with C.I. engines either by or for the Air Ministry.

The chief technical details of this engine are:—

Power.—480 b.h.p. at normal charge and r.p.m.; 500 b.h.p. at maximum charge and normal r.p.m.

Rotation of Airscrew.—Left-hand tractor.

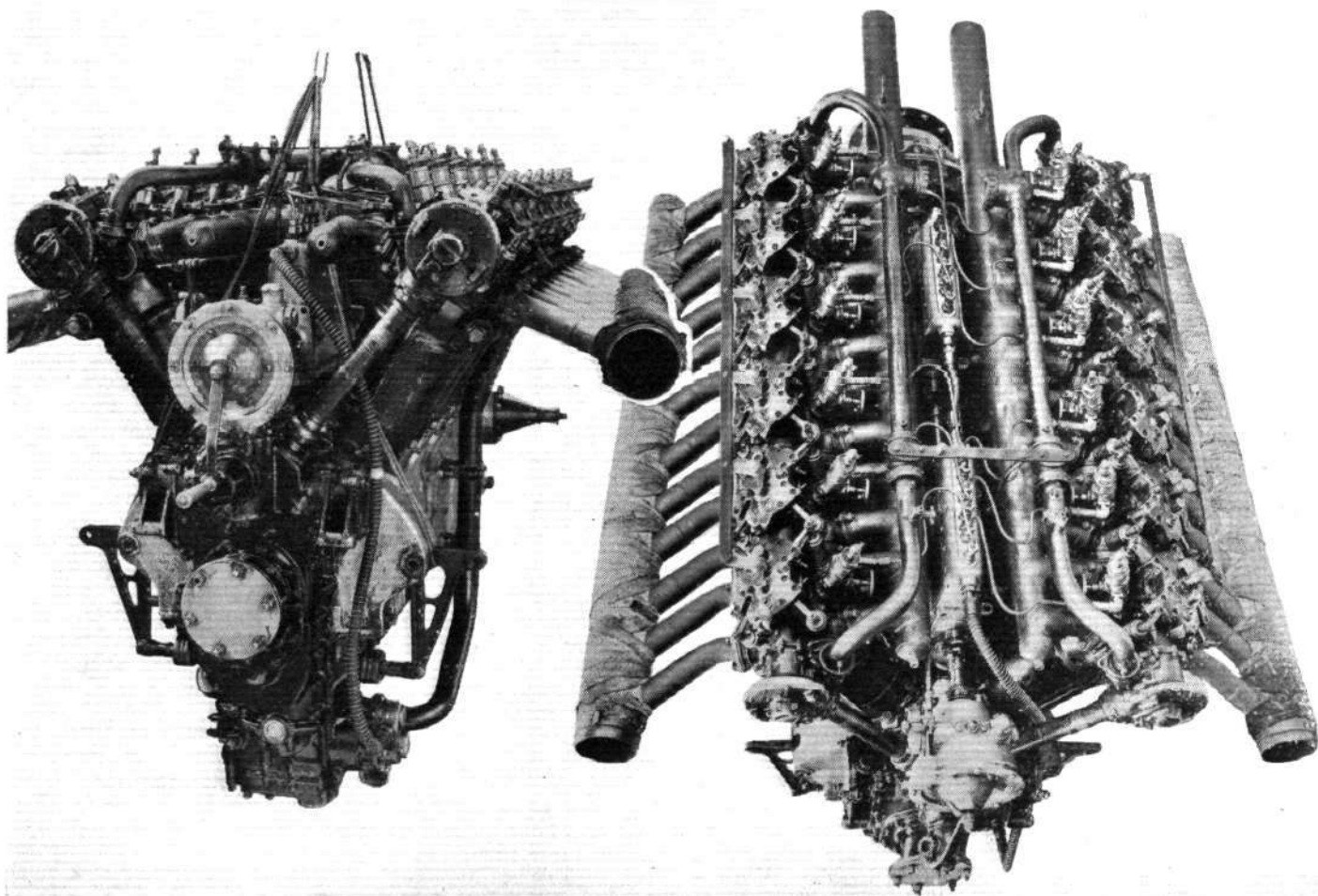
R.P.M.—1,900 normal, 2,000 maximum.

Weight.—1,504 lb. with starter and accessories, but less airscrew boss.

Cylinders.—Twelve in two banks of six at 60 deg. V., water-cooled; two inlet and two exhaust valves. Bore and stroke $5\frac{1}{2}$ in. \times $7\frac{1}{2}$ in.; stroke/bore 1:1.363. Compression ratio $12\frac{1}{2}$:1. Maximum pressure 800 lb. per sq. in.

Cycle Operations.—Four-stroke solid injection.

Overall Dimensions.—Length, $74\frac{1}{4}$ in.; width, $30\frac{1}{2}$ in.; height, $45\frac{1}{2}$ in.



Two views of the Rolls-Royce "Condor" compression ignition engine, which has successfully passed its Type Test. (Crown Copyright Photos.)

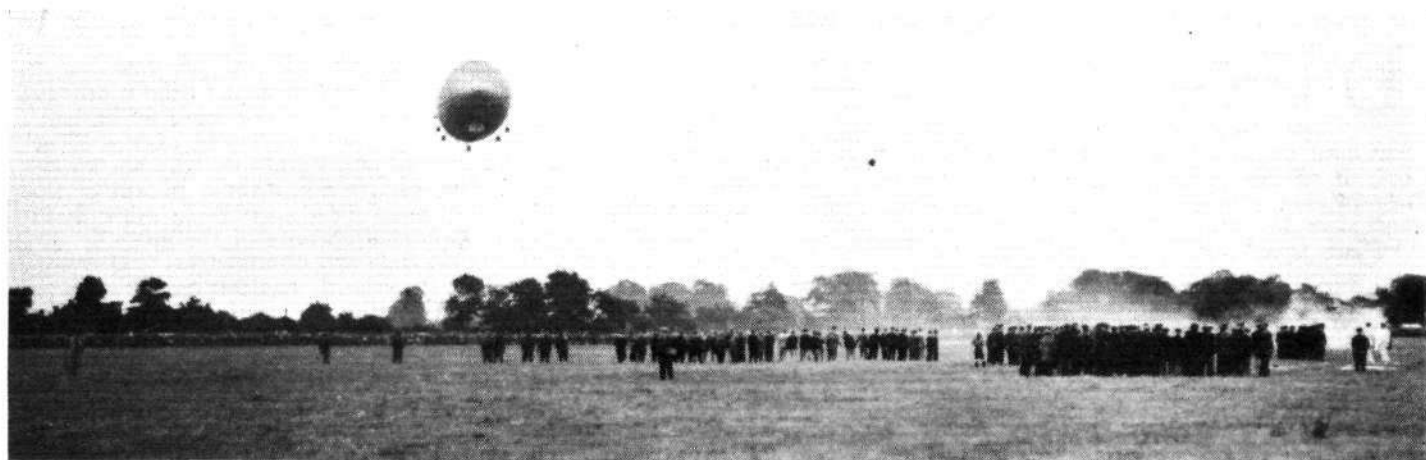


Aerial Photography

OWING to the success of the exhibition of aerial photography held at the Camera Club last May by Aerofilms, Ltd., the exhibition was booked for a number of art

galleries and has been making a tour during the last few months and attracted considerable attention. At Sunderland Art Gallery over a thousand people saw the show in two hours and there was a queue waiting admission.

Air Transport



SOME GRAF ZEPPELIN STATISTICS

AS recorded last week the German airship *Graf Zeppelin* concluded the last of her round trips between Germany and South America for the present season when she arrived back at Friedrichshafen from Rio de Janeiro on November 3. It may, therefore, be opportune if we give the following statistics regarding *Graf Zeppelin's* past activities, which we think will be of great interest.

With the landing in Friedrichshafen on Thursday, November 3 last, the *Graf Zeppelin* has made 290 cruises, covering 530,600 km. (329,715 miles) in 5,369 hr. Thus an average speed of about 100 km. per hr. (62 m.p.h.) has been maintained. During these 290 cruises 7,495 passengers have been carried. In 1932 the airship has made altogether 58 cruises covering 180,780 km. (112,336.7 miles) in 1,766.4 hr., and 1,218 passengers, 2 745 kg. (6,052.7 lb.) of mail and 2 021 kg. (4,456 lb.) of freight were carried. In connection with the 290 cruises—during which she has visited various European countries (including England), the Arctic, North and South America—the airship has made 111 landings outside Friedrichshafen, so that in each case untrained persons assisted in the landing. In Brazil also there has been a different squad of soldiers each time to assist. For the last two cruises only, a definite group of workers has been trained. The airship has crossed the Equator 26 times and made 33 ocean crossings. Thirteen cruises have been made to South America and return, of which five were extended to Rio de Janeiro. Four landings have been made in Rio and passengers embarked and disembarked.

The longest trip from Friedrichshafen to Pernambuco took 76 hr. 35 min., the shortest 62 hr. 30 min.; whilst for the return cruises 101 and 67 hr. were taken. In the time-table the trips were fixed at 72 hr. and 96 hr.; the

average times taken were, as a matter of fact, 71.51 and 86.0 hr.

With the exception of two cruises this year's programme has punctually been adhered to. In the case of these two cruises there was a 24-hr. delay in starting from Friedrichshafen, which in both cases was due to the technically faulty arrangements of the landing ground in Friedrichshafen. In both cases, however, the delay was made up for on the return trip from Pernambuco, so that the return could be made according to time-table and the next South American cruise commenced on the scheduled date.

Whilst the first South American cruise in the year 1930 must be considered as essentially a trial trip, three such cruises were made in Autumn 1931—one cruise per month—which already showed an increase in passenger and mail figures.

The same increase could also be observed in the nine cruises of 1932. On the first trip of this year 10 passengers were on board, whilst on the last cruise the airship left Pernambuco with 18 passengers, three more embarking at Seville. The mail figures this year increased from about 60 kg. (132 lb.) on the first cruise to 160 kg. (373 lb.) on each of the two last return cruises from Pernambuco.

With the extension of the cruises from Pernambuco to Rio a large number of bookings immediately resulted. From Pernambuco to Rio the airship was always fully booked (22 to 23 passengers). For the last cruise applications from more than 30 passengers were received in Pernambuco.

The large majority of return passengers embarked at Rio, from which fact it is apparent that with the extension of the airship line to Rio, passenger figures will in future be more favourable than when, as up to now, the airship has only sailed as far as Pernambuco.

Zeppelin Airports in Spain

DR. ECKENER visited Barcelona last week and discussed with the municipal authorities plans to make Barcelona his European terminal for a Zeppelin service between Europe and Brazil, on a schedule which he hoped would eventually permit a weekly trip each way with two airships. He is going on to Seville, which is also pressing its claims as a terminal airport.

Birkett Air Service, Ltd.

As was announced in our issue of last week under new companies registered, Flt. Lt. G. Birkett, R.A.F.O., with the assistance of Messrs. P. and H. Colin, has inaugurated a new air taxi service to operate from Heston Airport on "Puss Moth" machines at a rate of 6d. per mile per passenger. In the spring of next year the company hope to acquire a four-seater which will operate at an attractive price. Although the taxi service has been operating for only one month, well over 3,000 miles have already been flown.

Some Australian Statistics

THE total number of passengers carried by Qantas Airways, Queensland, for the month of September has been the highest since the end of 1929, according to advice received by the Shell Company from their Brisbane office. The number reached 309, and on taxi flights alone, apart from the regular services, 5,306 miles were flown, including an ambulance call to Longreach, an urgent flight by a Brisbane surgeon to Maryborough, and numerous trips to the Cracow goldfields by business men and investors interested in the latest developments of the field. The freight for the month weighed nearly two tons and was a record for the past year.

West Australian Airways, Ltd., issues the following figures for the month of September:—Passengers carried (Perth-Wyndham), 222, (Perth-Adelaide) 315, (taxi and joy ride) 171. Machine flights, 164. Miles flown, 29,700. Letters carried (Perth-Wyndham) 933 lb., (Perth-Adelaide) 1,275 lb. Freight carried (Perth-Wyndham) 12,402 lb., (Perth-Adelaide) 3,041 lb.

Airport News

CROYDON

DURING the week several damaged aeroplanes were brought into the repair section of the Cirrus-Hermes Engineering Co., Ltd. Although this department was only opened a short time ago, it has been so well patronised that it is now an important branch of the company—the increase in work last week necessitated the employment of more men who are expected to be permanently engaged.

There is an increasing demand for the new Hermes IV engines, and delivery of these is now being effected to a number of foreign countries, where they are being installed in new types of aircraft.

The fastest time on record for a flight from Croydon to Le Bourget in a British-built light aeroplane, was made by Capt. Percival on Wednesday, November 9, in his monoplane the "Gull," which he designed himself. He made the journey in 96 min., with no wind to help him. The "Gull" was built at Croydon, and is fitted with the original 130-h.p. Hermes IV engine.

Thursday proved to be an unlucky day for Imperial Airways, their Paris services being disorganised owing to general bad weather with thick fog in the Channel. The air liner "Hengist," which should have left Croydon at 9 o'clock for Paris, landed at Lympne, the passengers completing their journey by boat and train.

Weather conditions improved later in the morning, but it was not until after 11 o'clock that the "Heracles," which should have left Paris at 9 a.m. was able to start on her journey; consequently there was no 42-seater at Croydon to operate the 12.30 service. It was therefore decided to fly the "Hengist" back to Croydon empty. It was not until after 1 p.m., however, that the plane was ready for service. Among the passengers who waited was the Maharajah of Jodhpur and fifteen members of his entourage.

Herr Lubitsch, the German film producer, travelled by the Deutsche Luft Hansa to Berlin on Friday morning.

A new novelty in the form of a pocket book is presented to all passengers flying either to Brussels or Cologne by

S.A.B.E.N.A., the Belgian Air Lines. In the centre of the pocket book is a neatly-folded map of the route showing all the principal places of interest over which the air liner is scheduled to fly, and the inside of the cover is made up of a number of small pockets, suitable for holding air travel tickets, etc., while a small packet of chewing gum and a portion of cotton wool are other features which add to the general usefulness of the gift.

Mr. Sing, who some time ago obtained his "B" licence with Rollason, Muir & Rickard, has returned from a visit to his home in India. He has spent much of his time during the last few days in taking some of his Indian friends for pleasure flights. Another Indian pupil joined the school last week and hopes to obtain his "B" licence before his return.

At Ford, several pupils are waiting for favourable weather to pass for their "A" licences and three new members have been enlisted.

Rollason, Muir & Rickard are offering very low terms for carrying out C. of A's. and free storage for the winter is offered to any private owner who takes an aeroplane or engine to them for a C. of A.

Mr. Georges Seversky, the singing pilot, accompanied by his wife and friends, arrived by the Air Union on Friday from Cannes, where he has been staying for the past two months. Mr. Seversky always makes a point of travelling by air whenever possible.

A visit by air to the aerodromes at Gatwick, Gravesend and Heston has been made by the Flying Superintendent and the Croydon Manager of the Royal Dutch Air Lines, with a view to making arrangements for emergency landing grounds in bad weather.

It is their contention that should it become necessary for one of their planes to land on account of adverse weather conditions, they should do so at a place where there is a club where passengers can be comfortably accommodated. The total number of passengers for the week was 1,019; freight, 52 tons 1 cwt.

"HORATIUS."

FROM HESTON

MONDAY, November 7, was a nice clear day, and the Household Brigade machine left early for Portsmouth, piloted by Mr. F. E. Clifford, with his wife as passenger. They returned during the

afternoon. Mr. Lausez arrived from Antwerp, with his wife as passenger, in his (Gipsy III) "Moth." The machine bore on its tail and sides that well-known blue label—but much enlarged—"Fyffes." Mr. Ellison, of the Birmingham Flying Club, flew down on a Club machine, accompanied by the Chief Instructor—Mr. Sutcliffe—returning to Birmingham after lunch. Banco's "Puss Moth" returned from Catterick, with two passengers, young college boys on long leave.

On Tuesday, November 8, Mr. C. W. Elliott, the Accountant of Airwork, Ltd., left Heston, accompanied by his wife, for Liverpool to attend the ceremony of his father-in-law (Alderman Alfred Gates) being installed as Lord Mayor of Liverpool. Col. Strange kindly loaned them a Spartan three-seater for the trip, and Mr. E. H. Newman piloted the machine. One "Moth" and one "Desoutter" arrived from Brussels.

On Wednesday, November 9, Herr Junck, Heinkel's chief test pilot, arrived from Rotterdam, with a mechanic, in Heinkel He 64 (D-2303). He is to give a demonstration at Radlett on Friday. The Chief Pilot and Traffic Manager of the Royal Dutch Air Line visited Heston to-day in the liner PH-EEZ (Fokker three-engined machine) with a view to arranging to use Heston as an alternative landing ground to Croydon when the latter—owing to weather conditions—is unsuitable.

Mr. Lausez returned to Ostend on Friday, November 11, in his "Moth" (Gipsy III).

On Sunday, November 13, Flt. Lt. Bulman left for Paris, in Hawker "Hart" J. 9941, to attend the Paris Aero Show, and Lord Douglas Hamilton arrived from Paris in a "Moth," with Lady Douglas Hamilton as passenger.



A device invented by The Automobile Association showing magnetic tracks from Heston Airport to the principal aerodromes in Britain. By this means a pilot can immediately find his course without the aid of a protractor, etc.

Airisms from the Four Winds

The Prince's New Machine

H.R.H. THE PRINCE OF WALES has placed an order with Vickers (Aviation), Limited, for a Vickers "Viastra" passenger monoplane, of a similar type to that which has been operating successfully in Western Australia for the past two years. The cabin and aeroplane generally will be adapted to meet the Prince's own requirements. Two Bristol "Pegasus" engines will be fitted and also a powerful radio set. This will be in addition to the Prince's "Moth" aeroplanes which have been in constant use for the past three years.

Mrs. Mollison's Good Start

MRS. J. A. MOLLISON (Miss Amy Johnson) left Lympne on November 14 at 6.37 a.m. in her "Puss Moth" (Gipsy Major), *Desert Cloud*, on her attempt to better her husband's flight to the Cape in 4 days 17 hours 22 minutes. As stated last week, she is flying the West Coast or Great Circle course (about 6,200 miles), her route being Oran, Colomb Bechar, Reggan, Gao, Niamey, Duala and Walfish Bay. After a flight of 13 hours Mrs. Mollison landed at Oran, thus completing the first 1,100 miles' stage of her journey in fine style. Refuelling operations were put in hand immediately, and at 11.30 p.m. she started off again for Niamey. Mrs. Mollison's flight is not, after all, a "race," for it appears that the report that Mr. O. Thaning, the Danish Vice-Consul in Johannesburg, was also attempting the flight to the Cape was incorrect.

The Flight from the Cape

MR. VICTOR C. SMITH, the young South African airman, who is attempting to fly from the Cape to Croydon in record time in a "Moth" (Gipsy II), left Capetown at midnight on November 12-13. He arrived at Walfish Bay at 10.15 a.m. on November 13, and leaving again one hour later, reached Pointe Noire early next morning, one hour behind his schedule.

Von Gronau Home Again

THE German airman Von Gronau, who, with G. von Roth (2nd pilot), Fritz Albrecht (wireless) and Franz Hack (mechanic), left Germany in a Dornier "Wal" flying-boat last July on a flight round the world via Iceland, North America, Japan, India and Persia, landed on Lake Constance at Friedrichshafen on November 9. Pressure on our space this week prevents our giving further details of von Gronau's flight, but we hope to be able to do this in our next issue.

"Luxury Air Yacht" Held Up

THE Supermarine "Luxury Air Yacht" *Windward III* owned by Mrs. J. J. James, in which she left Southampton last month on a Mediterranean cruise, was forced down off the coast of Brittany on November 8 and was towed to Douarnenez. Mrs. James and her party were not on board, but arrived on the scene later.



ROUND THE WORLD IN A FLYING BOAT: Von Gronau and his crew in the Dornier Wal which has just completed a world flight.

Sqd. Ldr. Hinkler Rewarded

THE Johnston memorial prize for the year has been awarded to Sqd. Ldr. Hinkler for his flight across the South Atlantic. On November 25, 1931, Sqd. Ldr. Hinkler, who had flown non-stop from New York to Jamaica, and then by stages to Port Natal, Brazil, set out to fly the 2,000 miles across the Southern Atlantic aiming for Bathurst in the Gambia. For 22 hr. he fought his way through rain and thunderstorms, eventually crossing the African coast ten miles south of his objective with barely 2 hr. petrol left in his "Puss Moth." Sqd. Ldr. Hinkler's flight was all the more remarkable for the fact that his machine carried no navigation instruments other than two compasses. The Johnston memorial prize is a silver plaque showing Mercator's projection of the world. The prize is awarded annually in memory of Sqd. Ldr. E. L. Johnston, who lost his life in the holocaust of *R.101*.

A New Seaplane Carrier

THE *Daily Telegraph* announces that a novel addition is about to be made to Naval armament in the shape of an "aircraft cruiser," a ship with the speed and armament of a cruiser but which carries a complement of seaplanes. It is reported that the navies of America, Japan and Sweden are to be equipped with these cruisers, Sweden leading the way with the *Gotland*, which will be launched within a few months and will have a tonnage of 5,260, developing a speed of 27 knots and carrying 12 seaplanes which will be launched into the air by catapult or, under their own power, from the water. The Japanese cruiser will be of 9,000 tons, capable of 33 knots, and the American ship of 10,000 tons, and probably capable of even higher speed. These new cruisers will be built to come within the elastic limits laid down by the London Naval Treaty.



THE HESTON MART: Heston Airport is always introducing new, up to date, features, as this row of show-rooms indicates. Here you can buy new or secondhand aeroplanes, insurance policies, and even photographic materials. (FLIGHT Photo.)

TO WELCOME MR. E. P. WARNER,

"Aviation" (U.S.A.) Editor

AT the bidding of Com. Murray, U.S.N., America's Naval Attaché, a goodly number of prominent men in the aviation world foregathered at a luncheon on Thursday last week at the Hyde Park Hotel to do honour to Mr. Edward P. Warner, the very popular Editor of our United States contemporary *Aviation*, who has been on a short visit to this country.

Com. Murray, who occupied the Chair, after the King's toast, after about a dozen words, saying there were to be no speeches, left the field open for Mr. Warner to pass on his views and opinions upon aviation matters in the States. And a big budget of facts and figures resulted from the guest of the day, given in an exceedingly lucid and interesting form, although his speed of speaking, however clear, made it at times a little difficult to absorb the details of facts with which he regaled his listeners, a speed well in keeping with that which aviation has set the world of transport.

Mr. Warner at the outset, in regard to any facts he might give, wished to make it quite clear that he desired it to be understood that he claimed no monopoly in brains or in the power of production for his country. He only proposed to give a few facts and leave inferences to be deduced for the good of all. And some of those things might not, perhaps, be quite to the liking of his own countryman. In Washington, he said, there was an organisation of newspaper editors, who met twice annually to discuss certain subjects relating to who, which, what and how leading public characters should be handled in cartoons and other directions. Ladies might be present *but no reporters*. Therefore, with this warning from Mr. Warner, it naturally follows that just a few points only are given out of the great many which he was able to fire at his audience.

He emphasised that in air transport America looked forward with confidence more than any other country in the world; the U.S. Government had given good support to the transport lines. In regard to the life of transport machines, this had raised a serious manufacturers' problem as, instead of their lasting three years as it was anticipated, they went on indefinitely, and were still, subject to overhauling, giving good service after five years. In fact, there were at present some 600 planes built in 1929 still operating.

In regard to the future, seven or eight factories were now manufacturing machines for early delivery—all alike in their characteristics and giving a cruising speed of 140 m.p.h. The following year this would be 150 to 160 m.p.h. He did not agree with this demand for higher and higher speed. It could not be achieved, coupled with economy. His idea of an operating speed, with economy, was nearer 120 to 140 m.p.h. Operators, however, insisted they must have a higher ratio, not less than 200 m.p.h. He preferred at most 160 for 1933 and gradually to rise thereafter. The speed demand resulted in the lines with 175 m.p.h., gradually taking away the business of the 120 m.p.h. lines.

An advantage for flying at home was that there were landing grounds practically 25 miles apart, a number of which gave 3,000 to 5,000 ft. run for taking off and landing. Regarding the internal cabin arrangements, if the

great public were to be attracted to use air lines regularly, in the end the constructors would have to equal the luxury travel of the railways, etc. This would not include business men, who would be prepared to put up with many shortcomings in favour of speed.

Regarding miles flown, in 1929 some 50 millions were flown; 100 millions in 1930, increasing to 150 millions in 1931. The passenger revenue now was 10 million dollars; the Post Office (for domestic postage) 20 million dollars and for foreign 7 million, about two-thirds of the entire revenue being for mails. In three to four years the commercial lines would have to be, and could be, self-supporting on typical routes—except the non-commercial politically created lines.

In mentioning general design, etc., Mr. Warner said the tendency was towards monoplanes, especially from the military side—these also attracting the attention of the Navy, they being concerned with compact parking space on the carriers. Duralumin was the metal preferably chosen; water-cooled power plant was practically dead, although the Army were still taking delivery, but the Navy none. Air-cooling was definitely in the ascendant. Three-engined plant was losing favour against twin-engined, especially in transport—ring-cowling helping to bring this about; retractable gear was more and more in favour, and in spite of all disadvantages would prevail in time; control by flaps was popular; on score of weight and ease of maintenance, air-cooled engines were preferred, and variable pitch propellers were likely to be in general use. One thing he said he had urged was the use of better fuels. Now all military machines used "Ethyl" spirit, giving more power for the same engine, one firm telling him it had saved him 5 per cent. in his fuel bill. "Private" owners numbered 3,500, most of these being in some way connected with aviation business, and other business men. If they expected the industry to go forward and prosper, they must develop the real private plane owner. So far they had not reached the purely amateur private owner.

In regard to blind flying, although their pilots had for some time ridiculed the whole idea, they had now seen the error of their ways and had taken it up strongly. Recognised licensed machines totalled 10,600. In addition there were some 3,000 "identified" machines (not registered), although he thought about half of these did not exist at all. Classified machines gave, roughly, to transport 650, oil interests 100, "officials' transport" 100, flying clubs 500 and for odd jobs, etc., about 2,000. Finally, in regard to really private ownership *without any aviation interests*, he would put the figure at 500.

Altogether a very informative talk.

Amongst the guests of the American Embassy were:—

Lord Gorell, C.B.E., M.C.; Air Vice-Marshal H. C. T. Dowding, C.B., C.M.G.; Lieut.-Colonel F. C. Sheldermine, C.I.E., O.B.E.; Sir John D. Siddeley, C.B.E.; F. Handley Page; John D. North; Harold E. Perrin; Captain H. R. Gillman; Major Oliver Stewart, M.C., A.F.C.; Stanley Spooner; Captain H. S. Howard (C.C.), U.S. Navy; Lieut.-Colonel Cortlandt Parker, U.S. Army; Major M. F. Scanlon, U.S. Army; Major W. T. Piggott, U.S. Army; Raymond E. Cox, American Embassy; Robert A. Bruce; Group Captain A. B. Burdett, D.S.O., O.B.E.; T. O. M. Sopwith, C.B.E.; Edward C. Bowyer; Colonel The Master of Sempill; Major T. M. Barlow; H. E. Wimperis, C.B.E.; Sir Robert McLean; Captain J. S. M. Ritchie, R.N.; Mr. W. T. Prendergast, American Embassy; C. G. Grey; Commander G. D. Murray, U.S. Navy

The "Corona" Parachute

THE Swedish Government has placed an order for a supply of "Corona" parachutes designed by Carl Lunholm. This parachute incorporates in its design several novel features, chief of which is the fact that it can be released either by hand or automatically by means of a release line attached to the machine. Objection has often been raised to automatic release on the grounds that danger of fouling the release line is too great, but Mr. Lunholm has bestowed special care upon the manner in which the release rope is packed and attached to the machine. This parachute is also equipped with a shock-absorbing device and the harness is so constructed that the opening shock affects the less sensitive parts of the body, also the designer claims that the unpleasant swinging motion which usually accompanies the opening has been minimised by equipping the parachute calotte with a number of "outlet holes."

Manchester Model Aircraft Society

THE above-named Society has recently been formed to

further the science of model aeronautics in Manchester and district by practical experiments in the design, construction and flying of models, both scale and otherwise. Whilst it is intended to concentrate on the scientific value of experiments, at the same time the sporting side of model aviation will be well provided for by various competitions throughout the year. Meetings will be held each Sunday (weather permitting) on the Old Aerodrome, corner of Mauldeth Road and Princess Road, Alexandra Park. Those desiring full particulars of membership to the Society should communicate with the Hon. Secretary, J. Pearce, 26, Elms Road, Heaton Moor.

Deutsch de la Meurthe Cup

INTENDING competitors are reminded that the late entries will be received up to February 1, 1933, by the Aero Club de France. The race will be held in May, and the prizes amount to 100,000 francs. It is an International Speed Contest, and engines are limited to a capacity of 8 litres. Copies of the Regulations can be obtained from the Royal Aero Club, 119, Piccadilly, London, W.1.

THE ROYAL AIR FORCE

London Gazette, November 8, 1932.

General Duties Branch

Lt. E. H. Shattock, R.N., is reattached to R.A.F. as Flying Officer, with effect from Oct. 31, and with seniority of Aug. 2, 1927. The undermentioned Pilot Officers are promoted to rank of Flying Officer:—S. M. Moseley (Oct. 10); J. W. Burgess, T. G. Lovell-Gregg, J. B. Sims, H. McC. White (Oct. 13).
 Flt.-Lt. L. E. M. Gillman is restored to full pay from half pay (Oct. 28).
 Flt.-Lt. J. W. Bell, D.S.M., is placed on half-pay list, Scale A (Nov. 4).
 Sqdn. Ldr. R. F. S. Leslie, D.S.C., D.F.C., A.F.C., is transferred to half-pay list, Scale B, from half-pay list, Scale A (Oct. 26). Lt.-Cdr. M. S. Slattery, R.N., Flt.-Lt., R.A.F., ceases to be attached to R.A.F. on return to Naval duty (Nov. 1). Sqdn.-Ldr. S. S. Benson, A.F.C., ceases to be seconded to Imperial Japanese Navy (Nov. 2). Pilot Officer on probation D. G. Ross is transferred to Reserve, Class A (Nov. 4).

Stores Branch

The undermentioned are placed on retired list:—Flt.-Lt. F. J. B. Powell, M.B.E. (Nov. 5); Sqdn.-Ldr. J. Walker (Nov. 4).

Medical Branch

F/O. E. K. Pritchard, M.R.C.S., L.R.C.P., relinquishes his commn. on completion of service (Oct. 20).

ROYAL AIR FORCE RESERVE. RESERVE OF AIR FORCE OFFICERS

General Duties Branch

C. F. Fyfe is granted a commn. in Class A as Flying Officer on probation (Oct. 25); E. B. Nelson is granted commn. in Class AA (i.) as Pilot Officer on probation (Oct. 17); F/O. A. G. Lester is transferred from Class A to Class C (Nov. 6); F/O. (Hon. Flt.-Lt.) L. A. Parker relinquishes his commn. on completion of service and is permitted to retain the rank of Flight Lieutenant (Oct. 24).

Medical Branch

Flt.-Lt. R. F. T. Grace, M.D., is transferred from Class D (ii.) to Class D (i.) (Sept. 23).

AUXILIARY AIR FORCE

General Duties Branch

No. 602 (CITY OF GLASGOW) (BOMBER) SQUADRON.—Pilot Officer J. H. Hodge is promoted to rank of Flying Officer (Sept. 30).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Flight Lieutenants: J. C. M. Hay, to R.A.F. Base, Malta; 19.10.32. E. S. C. Davis, A.F.C., to R.A.F. Base, Calshot; 19.9.32. G. N. Coward, to H.Q., R.A.F. Middle East, Cairo; 20.10.32. H. F. Luck, to Station H.Q., Hal Far; 19.10.32. D. H. Carey, to Home Aircraft Depot, Henlow; 5.11.32. R. Jones, to Electrical and Wireless School, Cranwell; 3.11.32. P. de C. Festing Smith, to No. 99 (B) Sqdn., Upper Heyford; 24.10.32.

Flying Officers: N. B. Norris, to No. 4 Flying Training School, Abu Sueir; 29.10.32. D. R. S. Bader, to Station H.Q., Duxford; 31.10.32.

Pilot Officer G. W. Heather, to No. 14 (B) Sqdn., Amman; 17.10.32.

Stores Branch

Squadron Leaders: T. S. James, to No. 2 Stores (Ammunition) Depot, Altrincham, 4.11.32, to Command vice S/Ldr. J. Walker. R. F. Osborne,

to No. 1 Stores Depot, Kidbrooke, 31.10.32, for Stores Duties, vice S/Ldr. H. E. Tansley, M.C.

Flying Officer L. W. Park, to No. 2 Flying Training School, Digby; 2.11.32.

Medical Branch

Flying Officers: The undermentioned Flying Officers are posted to Medical Training Depot, Halton, on 31.10.32 for an initial course of instruction on appointment to a Short Service Commn.:—J. D. L. Bolan, E. Donovan, R. E. W. Fisher, J. F. Sandow.

Dental Branch

Flying Officer C. R. Stone, to Medical Training Depot, Halton, 31.10.32, for an initial course of instruction on entry into R.A.F. on a non-permanent commn.

NAVAL APPOINTMENT

The following appointment has been made by the Admiralty:—

Lieut. A. G. Po? (F/O., R.A.F.), to *Britannia*, for R.N. College, Dartmouth (Nov. 15).



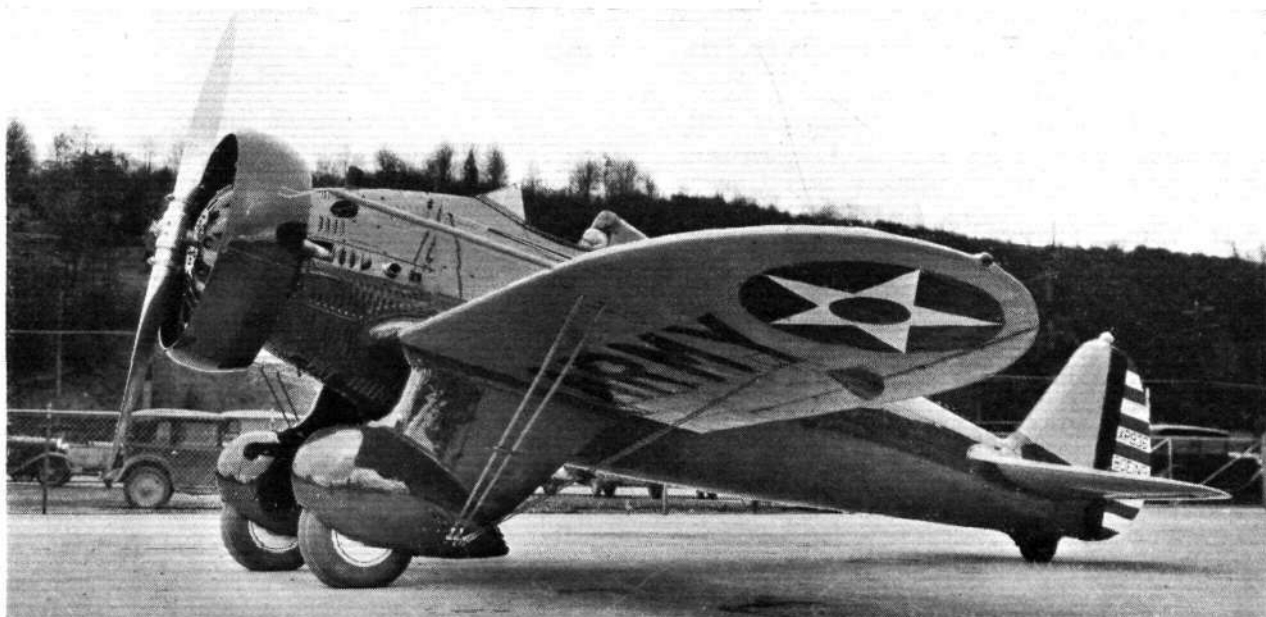
Air Defence Territorials

LAST March it was announced that the Territorial Army would be placed in charge of anti-aircraft coast defence, and would be re-organised for that purpose. This re-organisation has now been completed, and the new scheme will come into effect next April. A number of batteries, heavy, medium, and field, of the Territorial artillery have been converted into anti-aircraft batteries stationed along the south coast of England. Men up to 50 years of age are accepted for this service, provided that they do not number more than 33½ per cent. of the strength of a unit. For practice in peace and for service

in war, the men will work in the localities in which they live and with which they are familiar. This re-organisation should make easier the desirable transference of all elements of air defence to the complete control of the Air Ministry. The change from the Territorial Army to the Auxiliary Air Force would not affect the men much, and would greatly increase our national safety.

Flying Boat Development Flight, Felixstowe

THE "Flying Boat Development Flight" was merged into "A" and "B" Flights of the Marine Aircraft Experimental Establishment, Felixstowe, with effect from May 14, 1932.



A NEW BOEING PURSUIT PLANE: Marking a radical departure in the construction of pursuit type aeroplanes, the Boeing Airplane Company of Seattle has built and delivered to the U.S. Army Air Corps three experimental low-wing, all-metal, "Wasp"-powered fighters, designated by the Army as Model XP 96.

The Industry

CIRRUS NAME PLATES

ANY private owner or operator of an aircraft which is fitted with a Cirrus or Hermes engine can obtain, free of charge, a name plate from the Cirrus-Hermes Engineering Co., Ltd., Croydon. These plates are produced in nickel silver with the Cirrus-Hermes lettering in blue, and, whilst they are primarily intended as engine revolution plates on the dashboard, they can also serve for "No Smoking" notices or for recording the airman's name and address. Those of our readers who intend writing for these plates should state their engine number, type of machine and also their address.

A NEW JOINTING

WE are notified by James Walker & Co., Ltd., Lion Works, Woking, Surrey, of a new oil and petrol resisting jointing which they have placed on the market. It is known as "Gaskoid," and it is claimed for it that it is impervious to the action of oil and petrol. It has been officially accepted by the Air Ministry for use on Service aircraft. "Gaskoid," according to its specification, contains no rubber or rubber substitute, and will not disintegrate. It is suitable for sump joints or valve cover joints or any condition where an oil and petrol joint is required. It is supplied in sheets or in cut joints.

ANOTHER AGENCY FOR HENLYS

HENLYS, LTD., whose Aviation Department is at Heston Airport, announce that they have been favoured with the agency of the "Gull," and that they will be pleased to arrange

demonstrations for prospective purchasers at any time. This machine, which it will remember is the latest development of the "Hendy 302," has comfortable accommodation for three persons and a performance greater than any other aircraft of its type. It is the first aircraft to use the new Hermes IV engine, and has been flown successfully in many races during the past season.

AIRCRAFT FOR HIRE

BRIAN, LEWIS & CO., LTD., of 30, Conduit Street, London, W.1, have started a register of machines which will be available for hire when their owners do not require them. This is an admirable idea, which should not only do a great deal towards popularising flying, but also towards helping many private owners in the country. All owners of aircraft have been circularised, and if they are willing to hire their machines out under the scheme, have been asked to fill in a card, which is then put in the register to be kept at the head office of this company. Arrangements are being made for a G.E.'s inspection to be carried out either at Hooton or Heston prior to hiring, and if desired insurance rates can be obtained for the owners at short notice. The average hiring charges are approximately £3 5s. per day, £10 5s. per week and £40 to £60 per month, but the owners are in no way bound by these charges, and can, of course, make their own arrangements as desired. Brian, Lewis & Co. propose a charge of 5 per cent., to cover incidental expenses, on any hire materialising through their agency.

MORE M.G. RECORDS

THE M.G. "Midget," that fascinating little car so much liked by pilots and others who appreciate the value of rapid but economical transport, added still more to its laurels when Mr. E. R. Hall recently secured the standing, kilometre and mile records at Brooklands at speeds of 67.2 m.p.h. and 70.12 m.p.h. respectively. The "Midget" now, therefore, holds all the records in the international class "H" from the standing kilometre to the one-hour record, and also the two 750 c.c. Brooklands records for the outer circuit and the mountain course. In view of the interest which is being aroused in small aircraft engines, it is perhaps worth recording the speeds obtained on the track with this little car, bearing in mind that the capacity of the engine is barely 750 c.c. It would certainly be interesting to see what a supercharged engine of this type when specifically designed for aircraft use could achieve:—

1 km.,	standing start,	67.20 m.p.h.
1 km.,	flying start,	118.36 m.p.h.
1 mile,	standing start,	74.12 m.p.h.
5 km.,	flying start,	114.77 m.p.h.
5 miles,	"	114.74 m.p.h.
10 km.,	"	114.72 m.p.h.
10 miles,	"	114.46 m.p.h.
50 km.,	"	98.7 m.p.h.
50 miles,	"	99.8 m.p.h.
100 km.,	"	100.3 m.p.h.
100 miles,	"	101.09 m.p.h.
1 hr.,	"	101.1 m.p.h.
Brooklands records: Outer circuit, Class "H," 116.29 m.p.h.; Mountain course, Class "H," 69.28 m.p.h.		

CAPT. E. W. PERCIVAL'S ADDRESS

THE new address from which Capt. E. W. Percival will be transacting his business concerning the "Gull" is 20, Grosvenor Place, London, S.W.1.

IMPORTS AND EXPORTS

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910).

For 1910 and 1911 figures see FLIGHT for January 25, 1912.

For 1912 and 1913, see FLIGHT for January 17, 1914.

For 1914, see FLIGHT for January 15, 1915, and soon yearly, the figures for 1930 being given in FLIGHT, January 16, 1931.

Imports.		Exports.		Re-exports.	
1931.	1932.	1931.	1932.	1931.	1932.
£	£	£	£	£	£
Jan. .. 7,965	2,456	142,596	122,942	1,074	863
Feb. .. 3,303	2,503	110,587	181,482	1,293	90
Mar. .. 5,615	1,946	83,088	167,195	3,441	200
April .. 2,216	622	213,401	142,145	530	1,128
May .. 1,964	1,747	275,382	138,356	108	5
June .. 6,780	398	78,298	126,330	361	125
July .. 1,790	1,070	177,006	142,702	131	120
Aug. .. 3,556	511	153,834	111,073	2,316	3
Sept. .. 1,088	2,161	218,987	115,464	1,074	—
Oct. .. 1,863	1,511	124,810	192,361	4,505	147
36,140	14,925	1,577,989	1,440,050	14,923	2,681

PUBLICATIONS RECEIVED

British Empire Trades Index, 1932-33. Business Dictionaries, Ltd., 809, Johnson's Court, London, E.C.4. Price 2s. 6d.
Red Russia Arms. By J. B. White. London: Burrup, Mathieson and Co., Ltd. Price 3s. 6d. net.
Punch Almanack. Punch, 10, Bouverie Street, London, E.C.4. Price 1s.
Death Cometh Soon or Late. By J. A. Mollison. London: Hutchinson and Co., Ltd. Price 10s. 6d.
Journal and Record of Transactions of the Junior Institution of Engineers. November, 1932. London: Percival Marshall and Co., Ltd. Price 2s.

Aeronautical Research Committee Reports and Memoranda: No. 1482. Relative Temperatures of Brass when Subjected to Reversed Direct Stresses in Vacuo and in Air. By H. J. Gough and D. G. Sopwith. June, 1932. Price 4d. net. London: H.M. Stationery Office, W.C.2.

COMPANIES

Increases of Capital

CIRRUS-HERMES ENGINEERING CO., LTD. (Aeronautical engineers, etc., 274, Gresham House, E.C.).—The nominal capital has been increased by the addition of £19,000 in £1 ordinary shares beyond the registered capital of £1,000.

MODEL AEROPLANES AND TOYS, LTD.—Capital £3,000 in £1 shares. Manufacturers of aircraft and all other kinds of models and toys, woodworkers, carvers, etc. Directors: W. E. Appleby (permanent managing director), address not stated. A. E. Stead, 7, Rokeby Terrace, Newcastle-upon-Tyne, clerk. C. A. Reid, 76, Weldon Crescent, High Heaton, Newcastle-upon-Tyne, auctioneer. Solicitors: Septimus G. Ward and Rose, 61, Westgate Road, Newcastle-upon-Tyne.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1932

Published November 10, 1932.

- 1,492. B. O. GODFREY. Direct-reading pitchometers for measuring pitch angle and distance of screw propellers. (382,140.)
 5,520. SOC. ANON. DES ATELIERS D'AVIATION L'BREGUET. Wing structure for flying machines. (382,176.)

Published November 17, 1932

- 11,647. SOC. ANON. ATELIERS D'AVIATION L. BREGUET. Device for regulating the pitch of variable-pitch propellers during flight. (382,560.)
 16,637. LEICHTFLUGZEUGBAU KLEMM GES. and H. KLEMM. Aeroplane bodies. (382,584.)